

MASSACHUSETTS
HIGHWAY COMMISSION

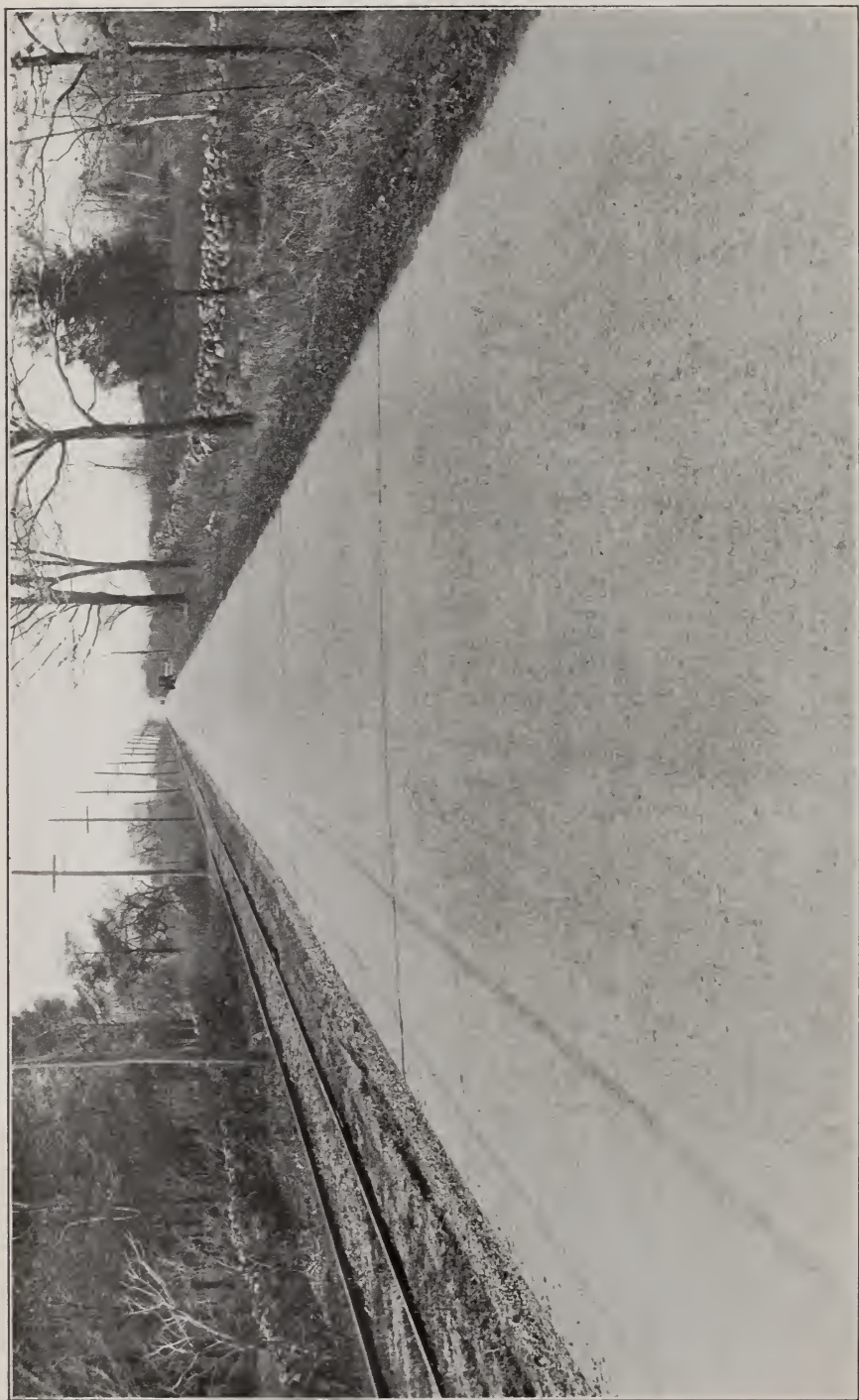
YEAR ENDING NOVEMBER 30

1916

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Concrete Surface in North Andover.

TWENTY-FOURTH ANNUAL REPORT

OF THE

MASSACHUSETTS

HIGHWAY COMMISSION,

FOR THE FISCAL YEAR ENDING NOVEMBER 30, 1916.

JANUARY, 1917.



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APPROVED BY THE
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The Commonwealth of Massachusetts.

To the Honorable Senate and House of Representatives of the Commonwealth of Massachusetts in General Court assembled.

The undersigned commissioners, appointed under the provisions of chapter 476 of the Acts of 1893 and of chapter 474 of the Acts of 1900, herewith submit their twenty-fourth annual report, in accordance with the provisions of chapter 47 of the Revised Laws, for the fiscal year ending Nov. 30, 1916.

WM. D. SOHIER.

F. D. KEMP.

JAMES W. SYNAN.

BOSTON, MASS., Jan. 3, 1917.

ANNUAL REPORT OF THE MASSACHUSETTS HIGHWAY COMMISSION.

The Board consists of the same members as last year. Mr. William D. Sohier was reappointed by Governor McCall on March 1, 1916.

ORGANIZATION.

The Commission has under its charge road work, the registration of motor vehicles and the licensing of the operators thereof, as well as the investigation of automobile accidents. There is a department for the highway work and another for motor vehicles, with a separate division for the investigation of accidents and the examination of operators. A chart is included in the 1913 report, showing the organization more in detail.

SECRETARY'S DEPARTMENT.

The several departments report to the Commission through its secretary, F. I. Bieler. His assistant is Fred Fair.

RECORDING AND ACCOUNTING DEPARTMENTS.

The records of the Commission are in charge of the recording secretary, Mary A. Riley.

The accounting department, which has charge of all expenditures, vouchers, the making of schedules, pay rolls, etc., is in charge of the auditor, John M. McCarthy.

HIGHWAY DEPARTMENT.

This department has charge of all road and bridge work, advice to municipal authorities, etc. At the head of it is the chief engineer, A. W. Dean, whose assistant is S. A. Parsons. The office engineering department, which makes the surveys, prepares all plans and estimates, etc., is in charge of A. M. Lovis. In this department are employed from 60 to 120 engi-

neers, draftsmen, instrumentmen and rodmen, depending on the season of the year and the amount of work on hand.

The State is divided into four divisions, each in charge of a division engineer, and each division engineer has one or two assistants in charge of particular work, like "small town" work, maintenance, etc., and as many resident engineers are assigned to his division from time to time as are necessary to supervise and inspect the actual work which is in progress.

Division I. is in charge of J. A. Johnston, with headquarters at Springfield, A. D. Dudley and H. D. Phillips being the assistant division engineers. This division includes most of Berkshire County, Hampden and Hampshire counties and a large part of Worcester County.

Division II. is in charge of C. H. Howes, with headquarters at Greenfield. This division includes Franklin County, a part of Hampshire County, and many towns in the northern part of Worcester County; also the road down Hoosac Mountain into North Adams.

Division III. is in charge of F. C. Pillsbury, whose assistant division engineer is D. H. Dickinson. The headquarters of this division are at Boston, the division including the eastern part of Worcester County, Middlesex, Essex and Suffolk counties and a part of Norfolk County.

Division IV. is in charge of W. R. Farrington, with H. C. Holden as assistant division engineer. This division includes part of Norfolk County and Bristol, Plymouth, Barnstable, Dukes and Nantucket counties, the headquarters being at Middleborough.

Most of the principal engineers and assistants have been in the service of the Commonwealth for over ten years, and quite a number of them for a much longer period of time.

As the work of this department grows it becomes more and more necessary that the engineers get rapidly from one job to another. In order to do so, motor vehicles must be used. The Commission now owns 24 automobiles, all operated by its engineers and foremen, thereby saving to the Commonwealth the cost of chauffeurs. This saving amounts to over \$20,000 per year. These employees are constantly in danger of being involved in accidents for which, as operators, they might be

liable. They, therefore, feel compelled to carry liability insurance.

It seems to the Commission that it would be proper and just for the State to allow an amount equal to the cost of liability insurance to such of the Commission's employees as run these automobiles. This cost will approximate \$1,000. The Commission, therefore, suggests that authority be given it to approve such an expenditure and charge the same to operating expenses.

MOTOR VEHICLES.

The automobile department, which is engaged in the registration of motor vehicles and the licensing of the operators thereof, including the collection of fees therefor, is under the charge of E. J. O'Hara. In this department there are from 50 to 100 assistants, clerks, stenographers, shippers, packers, etc., depending on the season of the year.

EXAMINATIONS AND INVESTIGATIONS.

This subdepartment, which conducts all the examinations of applicants for chauffeurs' licenses, etc., and investigates motor vehicle accidents, is in charge of F. L. Austin. There are 16 other examiners and investigators employed in this work.

HEARINGS.

During the year, 475 hearings were given on automobile complaints and accidents and matters relating to the registration and operation of motor vehicles.

Public hearings were given on special regulations made by municipal authorities affecting the use and operation of motor vehicles in Haverhill, Salem and Sherborn.

There were 15 hearings given on petitions for the location, extension and relocation of street railways on State highways.

In addition to the regular hearings held in each of the 14 counties, the Commission gave many hearings on petitions from various cities and towns for State highways or for aid in the improvement of town ways.

Besides these formal hearings given at the office or elsewhere to the authorities or representatives of the cities or towns, one

or more members of the Commission met the municipal authorities, or inspected the roads to be built or improved by the municipalities or otherwise, in more than three-quarters of the towns in the Commonwealth.

STATE HIGHWAYS.

During the year ending Nov. 30, 1916, the Commission completed work on about 31 miles of State highway, portions of which were laid out in 1915. Construction was commenced, but not completed, on over 17 miles of roads in 18 cities and towns. Layouts were made of about 54.47 miles of State highway in 39 cities and towns. The total length of State highways at the end of the year was 1,154.98 miles.

The total expenditures by the Commission for the construction of State highways since the work began, including the planting of trees, amounts to \$11,643,799.65. It must be remembered that the counties repay to the Commonwealth one-fourth of the cost of constructing these highways.

On Sept. 30, 1916, the total amount of bonds issued was only \$10,002,000. The sinking fund, established by law to extinguish these bonds, amounted to \$3,057,768; consequently, the net debt was only \$6,944,232. The expenditures were over \$11,600,000; the net debt was less than \$7,000,000.

The Commission feels safe in saying that the State highways could not be replaced in the condition they are now in, although some of them are over twenty years old, for considerably more money than the amount of the net debt, and it doubts if they could be replaced for the gross amount of bonds now outstanding, with the great increase in the cost of labor and materials.

Until 1913 there was only \$500,000 a year available for the construction of State highways and for the work on "small town" roads, \$75,000 of that amount going into the towns. The Legislature in 1912 authorized the expenditure of \$5,000,000 during the following five years, not more than \$1,000,000 to be spent in any one year for the above purposes. Of this amount, \$150,000 is to be expended upon the "small town" roads, \$100,000 of which is available only in case the towns contribute a like amount.

PETITIONS.

There were 974 petitions filed by the cities and towns for the laying out of State highways before this year, these petitions covering 2,275 miles of road. This year 26 petitions were received, covering 54 miles of road, making a total of 1,000 petitions now on file, covering about 2,329.20 miles of road in 30 cities and 237 towns.

SURVEYS, ESTIMATES AND DESIGNS.

During the year preliminary surveys, plans and estimates were made on contemplated State highways in 26 towns, covering an aggregate distance of 53.02 miles. Lines and grade for construction work on State highways were made in 27 towns, covering an aggregate distance of 32.40 miles, and for resurfacing work in 20 towns, covering an aggregate distance of 21.72 miles. Some of this work was done on roads where construction was commenced in 1915.

Final surveys were made on completed State highways in 27 towns, covering an aggregate distance of 36.16 miles, and on roads other than State highways in 27 towns, covering an aggregate distance of 37.22 miles.

On "small town" and "motor vehicle fees fund" work, so called, preliminary surveys, including plans and profiles, were made in 86 towns, covering an aggregate distance of 73.31 miles. Line and grade for construction have been made on these roads in 88 towns, covering an aggregate distance of 67.52 miles. In addition to the above, surveys have been made in 8 towns, covering an aggregate distance of 5.31 miles, said roads to be constructed by the town, and line and grade for construction for this class have been made in 5 towns, covering an aggregate distance of 2.02 miles.

Under special acts of the Legislature, surveys have been made in 13 towns, covering an aggregate distance of 18.58 miles, and lines and grades for construction have been made in 8 towns, covering an aggregate distance of 7.43 miles.

Under the "western counties" appropriation (chapter 221, General Acts of 1915) surveys have been made in 20 towns, covering an aggregate distance of 92.03 miles, and lines and

grades for construction have been made in 19 towns, covering an aggregate distance of 27.86 miles.

Layout plans have been made of roads in 39 towns, covering an aggregate distance of 54.47 miles.

Plans to accompany decrees for street railway locations on State highways have been made in 15 towns.

ROADS CONSTRUCTED IN 1916.

Construction has been completed on 30.60 miles of State highways, 45.01 miles of highways under the provisions of the "small town" act, 39.52 miles of highways under the provisions of chapter 525 of the Acts of 1910, and 23.96 miles of highways under the provisions of special acts, making a total of 139.09 miles completed during the year.

Of the above roads completed this year, 11.22 miles were of water-bound macadam; 46.25 miles were of gravel; 3.48 miles were of sand bound with asphalt; 18.61 miles were of bituminous macadam, that is, macadam with bituminous binder incorporated in the top course; 15.04 miles were of water-bound macadam with an oil surface applied; 3.93 miles were of crushed gravel with the top surface bound with asphalt; 5.17 miles were of cement concrete; 10.93 miles were of gravel with an oil surface applied; 14.95 miles were of sand and oil, layer method; .82 of a mile of broken stone and tar, mixed; .38 of a mile was of Warrenite; .06 of a mile was of granite block on a concrete foundation; and 8.25 miles were dirt roads, that is, surfaced with the best available material.

TREES ON STATE HIGHWAYS.

In 1916, as for the past several years, the work of suppressing insect pests on the trees on the State highways has been done under the direction of the State Forester, Mr. F. W. Rane. The results obtained have been most satisfactory.

Spraying was required in a number of localities to prevent the ravages of the elm-leaf beetle. This pest has made spraying necessary in many places where it was not required to prevent damage by the gypsy and brown-tail moths.

Mr. Rane's report appears in Appendix B.

During the last eleven years, 27,045 trees have been planted

on the borders of the State highways. This year the number of trees planted on State highways amounted to 3,381, and the Commission continued its policy of planting quick-growing trees and hedges to replace guard rails.

PERMITS.

There were 859 permits issued during the year for opening or occupying State highways for various purposes.

THE SEASON'S WORK.

This past year has been most unusual in many ways. Probably every year since the work began the Commission has been told by its engineers that the past winter has been an unusually hard one on the roads.

There is no doubt, however, that the winter of 1916 was hard on the roads, not only in this State but in all New England and in New York State. There was some very warm weather in January, resulting in a severe thaw, and very many miles of road broke up under the traffic. The same thing was true again in the spring.

This was due to the use of heavy motor trucks, which moved much heavier loads than had formerly been drawn over the roads. It was due, also, to the large number of automobiles that used roads that formerly had only a few teams using them each day. These vehicles broke through the macadam or gravel surface, often up to their hubs, and in trying to go on or get out they made deep ruts in the road, churned up the wet, soft soil from under the road and mixed it up with the broken stone or gravel until the road surface was practically destroyed. Some of the roads looked like plowed fields, with furrows 6 and 8 inches deep running through them, — these furrows being from 100 and 200 feet to over a mile in length.

A great many stretches of State highway that the Commission had expected to be able to maintain for several years at least, without any great expense, had to be entirely reconstructed. In many cases the old materials were so mixed up with the underlying soft soil that they could not be used; the whole section had to be dug up and a foundation of stone or gravel had to be put in before any new road surface could be

built. This involved a very large expenditure, and, in consequence, other old roads which should have been widened and resurfaced had to be simply patched and maintained.

MOTOR TRUCKS MAKE STRONGER ROADS NECESSARY.

The increase in traffic, and especially in the weight of traffic, makes stronger and more expensive road construction necessary.

The Commission believes that some law or regulation should be passed to prohibit the use of our country roads by such heavy vehicles that the roads are destroyed. They were not constructed to carry any such traffic, and the ordinary bridges are not nearly strong enough to be safe for use by these heavy trucks with large loads. Most of the bridges were built when the heaviest load that could be anticipated was a farmer's wagon carrying 3 tons.

The law exempted any city, town or county from any liability for damage if a bridge were used by any vehicle where the vehicle and load exceeded 6 tons in weight. Now it is no unusual sight to see a 6-ton motor truck carrying a 7-ton load going over the highway out in the country. The roads were not constructed to withstand any such loads, and in many places they are being greatly damaged or destroyed. This does not seem either equitable or good policy from any standpoint.

It seems to the Commission that the users of these large motor trucks neither make nor save enough money to justify such damage from any point of view. They often damage in one day 1 mile of road or break one bridge that costs more to rebuild than the whole value of the motor truck itself, and that same truck travels many miles in each day.

Very few, if any, of the towns can possibly afford to reconstruct their roads and make them strong enough to carry such traffic. It would at least take many years to do this, even in the cities and richer towns, and the poorer ones could never do it.

Even on the State highways the same thing is more or less true. No road built over six or eight years ago was made strong enough to withstand this traffic, and very few are probably being built even to-day.

Consequently, the Commission believes that something should be done to limit the weights of vehicles and loads that any one should be allowed to use on our highways, especially our country roads and bridges. The limit should be much below the present limit placed by law at 14 tons, including vehicle and load. At the most, not more than 6 tons, including vehicle and load, should be permitted to be moved over our country and village roads or bridges, or should be allowed on any highway that did not have a strong pavement.

Heavier traffic will rapidly destroy any gravel or macadam roads if many such vehicles use them daily. Even on city pavements it is extremely probable that it would be wise to have a much lower limit than the present one. Motor trucks are operated at much faster speeds than were horse-drawn vehicles, and consequently they do a great deal more damage, and are much more likely to damage a pavement or a bridge because of the impact caused by the speed.

Any law or regulation to be effective should provide that not only the operator who violated the law or regulation, but the owner of the vehicle as well, should be responsible for all the damage caused to the bridge or road, the money recovered being made available for the reconstruction or repair of the bridge or road.

ABNORMAL LABOR CONDITIONS THIS YEAR.

As every one knows, the labor conditions have been abnormal this year. There was such a demand for unskilled labor in the factories and mills, and such high wages were paid, that the employers secured a large proportion of the laborers that would ordinarily have been available for work constructing highways. The number of laborers available was also decreased because of the thousands of reservists who had to return to their native countries to join the armies. As a result, wages were not only greatly increased, but, also, there was a great scarcity of labor in many places. Farmers were reported to be paying \$4 to \$5 a day to secure help to harvest the hay crop.

Many times when this Commission advertised for bids this year, there were only two or three bidders; and all the bids, with even the lowest prices, were 50 per cent. to 60 per cent.

higher than ever before, and some of the bids were nearly 100 per cent. higher. The Commission, therefore, in several instances did not award the contract, because it felt that the Commonwealth could not afford to build or resurface the road at such excessive cost.

If conditions do not improve in the near future, the Legislature will have to recognize the fact that either a great deal more money must be appropriated, — for the reconstruction or widening of the old worn-out State highways, — or the roads will be rapidly worn out and destroyed.

The Commission has been unable to determine where to draw the line, — how much more it ought to pay than it has ever paid for a certain type of road, and when it ought to refrain from building the road at all because of the increase in its cost.

Changed Conditions affecting Contracts let in 1915.

In order to expedite the work, the Commission prepared specifications and let contracts for long stretches of road in a number of places. Contracts, calling for the construction of a number of miles of expensive road each, were advertised and let in 1915; also, contracts were let for shorter stretches of road where the construction was very expensive because of the large quantities of materials that had to be moved, requiring a large amount of labor.

Many of these contracts were let at low prices, even for 1915. In many places laborers could be hired for \$1.85, though \$2 was probably the prevailing price for eight hours' work. On many of these contracts a considerable amount of the work was done in 1915, but on many of them very little was done, and on all there was a very large quantity of work that remained to be done in 1916.

Even early in the spring it was difficult to secure laborers at \$2.40 a day; and in many places later in the year it was impossible to hire enough men at \$2.50, \$2.70 and \$2.80, and in some instances as high as \$3 a day was paid, and even then it was difficult to secure and keep enough laborers to prosecute the work economically or expeditiously.

Many of the contractors were losing large amounts of money,

and naturally the progress of the work was delayed, and both the Commission and the contractors were dissatisfied.

In some instances in order to get the work done and the road completed, it seemed wise to extend the work, but only equitable either to estimate it as extra work under the contract, or allow what our engineers estimated to be an equitable price because of the increased cost of the work caused by higher wages, a longer haul, etc.

Despite all reasonable allowances that could be made, the fact remains that the contractors who took contract last year where much work remained to be done this year lost money, some of them large sums. One contractor who had three good-sized contracts stated that he had already lost over \$20,000 on account of the higher price of labor.

The Commission has not felt, however, that it had a right to cancel contracts that were in force merely because wages had increased.

All the year the local quarries have not been able to produce as much broken stone as was needed for the road construction. In consequence the contractor absolutely could not get the necessary materials. One of the larger local quarries, from which many tons of stone were shipped daily for the roads, had a premature blast explode, which killed several of the workmen. The others all struck, and that quarry was shut down for a time. Meantime the contractor who was relying on securing stone from that quarry either had to shut down work or get his stone from somewhere else. The quarries also had the same difficulty in securing labor and had to increase wages.

All these conditions combined to delay the work and to decrease the quantity of work done.

If normal conditions had prevailed this year, it is probable that the Commission could and would have expended at least \$500,000, and possibly \$1,000,000, more money than it has in the construction of highways for which money was available, and also in the widening, resurfacing or reconstruction of some of the older State highways, which were merely maintained this year in the best possible condition, but which would certainly have been reconstructed or resurfaced if that

could have been done at any reasonable price. It seemed better to save the money, delay the work, and maintain the road, in the hope that conditions would improve next year, when the money can be spent to better advantage.

CHARACTER OF CONSTRUCTION OF ROADS.

The Commission has continued its policy of the last few years of building stronger, wider roads, with much less crown on all the main lines of traffic. This policy has been followed not only in the construction of new roads but in the resurfacing of the old ones. On main lines the hardened surface has been widened from the standard of 15 feet a few years ago to a minimum width of 18 feet on the straightaway, with shoulders 3 feet in width on each side, and 21 feet or more on the curves. All curves have been banked where possible with a pitch of from $\frac{3}{8}$ to $\frac{3}{4}$ of an inch to the foot of width.

On many main lines when the road has been resurfaced, it has been necessary, because of the heavy motor traffic, to put in a foundation, to make the road stronger, although the old macadam had lasted ten or more years, because of the few teams that used it. The Commission on these main lines has continued to build roads, using some form of bituminous construction on the top, or else it has built them of cement concrete. The materials used have varied with the estimated amount of traffic and the weight of traffic that may use the road, the material available, and other local conditions.

On the main routes it has built broken stone roads and grouted them with tar or asphaltic products, or it has used a surface made of hot gravel mixed with hot asphaltic oil, which has been described in former reports.

On Cape Cod, where the traffic is usually light in weight though extensive, and sand is abundant, it has continued to construct roads made of sand heated and mixed with a hot asphaltic oil. Some of these roads constructed six or more years ago are still carrying the traffic satisfactorily.

The same materials, to wit, mixed gravel and asphalt, and sand and asphaltic oil, have been used to quite an extent on a good many miles of road, both for widening the old macadam road and for a top surface about 2 inches thick.

Where bituminous materials were used and grouted into the broken stone, and wherever heavy traffic, especially motor trucks, would probably use the road, 3-inch stone was used on the top surface, this being thoroughly rolled, and the hot bitumen sprayed in under pressure. The smaller sizes of stone were then rolled in before a surface coat was applied.

On grades, the Commission has continued in many places to grout the top course of 3-inch stone with a hot mixture of tar and sand leaving the top surface rough, hoping that it will prove less slippery for horses. It has also for the same reason omitted the bituminous surface coat in some places. This may help for a time, but the Commission fears that the road surface will eventually begin to ravel or disintegrate because of the little holes left where water can penetrate the road and freeze, and that then the surface coat will have to be applied.

On main lines the Commission has more and more each year favored the building of cement concrete roads. More and more all over the country cement roads are being constructed. The State highways constructed in California in the last few years, with their \$18,000,000 bond issue, have been almost entirely concrete. They expect there, however, to cover them with an asphaltic top, the thickness of this top depending on the traffic. Concrete roads are very common in the western States, and many miles are being constructed in both New York and Connecticut.

No doubt the increase in heavy motor truck traffic has made roads of this character desirable in many places. The Commission has not felt, however, that even on main lines it should substitute cement concrete for all other forms of construction. It has, nevertheless, built a good many miles of concrete roads, and it is building more every year whenever on a main line the traffic is likely to be heavy and the road can be absolutely closed during construction. It is unwise to allow traffic to go over a concrete road during construction. The concrete must set at least ten days, even in summer, before it can be traveled over without being destroyed.

In reconstructing the worn-out older State highways, when a new foundation is necessary it may be wise to substitute a concrete road, but where there are 2 or 3 inches left of the old

road, well compacted, and it does not break through, it is much more economical to use the old roadbed as a base, and resurface it with 2 or 3 inches of some form of bituminous top.

Whenever the Commission has built concrete roads, it has made them at least 18 feet in width, and has used a good deal of care in preparing the drainage and foundation. It is using the best quality of materials, — cement, sand and stone carefully proportioned. It is building roads at least 5 inches thick on the sides and 7 inches thick in the center where conditions are good, and 6 inches in thickness on the sides and 8 inches in the center where they are not. For the last two years the Commission has been using some dehydrated lime with the cement to make a denser mixture and prevent the expansion due to moisture.

Some excellent concrete roads have been built that will compare favorably with those in other States. Credit should be given to the engineers in charge and to the resident engineers.

The Commission, while building stronger and more expensive roads where the traffic will be heavy, has continued its policy, especially in the western part of the State where the traffic is light in weight or consists mainly of automobiles, of trying to get the main routes widened and improved so that they can be used in safety and comfort during the summer at least. Here gravel roads have been built, where gravel was obtainable, otherwise, the best material available has been used. Every effort has been made to try to get a reasonably good road constructed, with proper drainage, good alinement, reasonable grades, and a stone or gravel foundation where necessary. This has seemed a wise policy to pursue, for if better and more expensive roads were built in one place, the construction of roads in other places would necessarily be delayed.

If, as seems probable, the country develops because of the construction of these highways, then it will be better able to build a more expensive highway.

BRIDGES AND CULVERTS.

The wooden pile bridge, 151 feet long, over the Sengekontacket River, in the towns of Edgartown and Oak Bluffs, work on which was commenced in 1915 under the terms of a special act of the Legislature, has been completed.

A concrete arch bridge with a 69-foot span was built in Clarksburg over the north branch of the Hoosac River. The county of Berkshire and the town of Clarksburg each contributed \$2,000 toward the cost of building this bridge, to replace the "Old Red bridge" which had become unsafe.

In the town of Petersham a concrete beam bridge with a 25-foot span was built over Swift River. The town contributed \$1,500 toward the cost of constructing this bridge and a short stretch of road.

In the town of New Salem a concrete beam bridge was built with a 22-foot span over Red Brook, the town contributing \$900 toward the cost of construction.

In the town of Lancaster where a concrete beam bridge was built, the town and the State each paid one-half of the cost of constructing the bridge and the road, the town appropriating \$11,000 toward the cost.

A 48-foot span, wooden pile bridge was built in the town of Barnstable, over the Santuit River.

Seventeen other concrete bridges or culverts were constructed with spans varying from 8 to 26 feet. Five of these were built with a concrete slab, and 12 were built with reinforced concrete beams and floor.

A number of these bridges were paid for by the municipalities or were on roads improved under the "small town" act.

The Commission has also had designs and plans made for the construction of 14 more concrete bridges or culverts which will be constructed in the near future either by the municipalities or the Commission. These new bridges will have spans varying from 8 to 35 feet in width. One of them is to have an arch made of reinforced concrete; 2 are concrete slabs, and 11 will have reinforced concrete beams and floor.

Further details of the bridges built this year are as follows:—

Bridges built.

Ashfield — over South River; concrete beam, 17-foot span.

Ashfield — over South River; concrete beam, 22-foot span.

Barnstable — over Santuit River; wooden pile, 48-foot span.

Belchertown — over Jabez Brook; concrete beam, 15-foot span.

Bridgewater — over Taunton River; concrete beam, two 28-foot span.

Charlemont — over Avery Brook; concrete beam, 18-foot span.

Clarksburg — over north branch of Hoosac River; concrete arch, 69-foot span.

Dudley — over Tufts branch of Quinnebaug River; concrete slab, 11-foot span.

Hinsdale — over Ashmere Lake; concrete slab, 12-foot span.

Lancaster — over Wickapeket Brook; concrete beam, 15-foot span.

Mashpee — over Mashpee River; concrete slab, 8.5-foot span.

New Salem — over Red Brook; concrete beam, 22-foot span.

Norton — over Canoe River; concrete beam, 17.75-foot span.

Norton — over sluiceway; concrete slab, 11-foot span.

Petersham — over Swift River; concrete beam, 25-foot span.

Pittsfield — over Shaker Brook; concrete beam, 18-foot span.

Rehoboth — over Palmer River; concrete beam, 18-foot span.

Rowley — over Dummer's Mill Brook; concrete beam, 17-foot span.

Shirley — over Mulpus Brook; concrete beam, 22-foot span.

Washington — over Cole's Brook; concrete beam, 16-foot span.

Williamstown — over Broad Brook; concrete beam, 26-foot span.

Worthington — over Ward's Brook; concrete slab, 9-foot span.

Bridges contemplated.

Conway — over branch of South River; concrete beam, 21-foot span.

Conway — over branch of South River; concrete beam, 17-foot span.

Cummington — over branch of South River; concrete beam, 14-foot span.

Deerfield — over Mill River; concrete beam, 17-foot span.

Deerfield — over Mill River; concrete beam, 16-foot span.

Dudley — over Tufts branch of Quinnebaug River; concrete beam, 13-foot span.

Dudley — over Tufts branch of Quinnebaug River; concrete beam, 12.5-foot span.

Huntington — over Pond Brook; concrete beam, 27-foot span.

Huntington — over Woodruff Brook; concrete slab, 12.5-foot span.

Methuen — over Bartlett's Brook; concrete arch, 16-foot span.

Petersham — over Swift River; concrete beam, 19.75-foot span.

Sheffield — over Konkapot River; concrete slab, 8-foot span.

Sheffield — over Konkapot River; concrete beam, 35-foot span.

Windsor — over branch of Housatonic River; concrete beam, 24-foot span.

LOCATION OF STATE HIGHWAYS (THROUGH ROUTES).

The Commission has continued its policy of filling in the gaps on the main lines of travel, building those sections in the smaller and poorer towns which could not afford to build or maintain roads of the character necessary to sustain the large amount of through traffic to which they are now subjected.

In the communities able to help themselves, the Commission has co-operated wherever possible. During the past two years

the counties, cities and towns have co-operated and built connecting roads, or made appropriations to aid in improving the main routes, to a much greater extent than ever before. Most of the counties are co-operating, and nearly one-half of all the municipalities have made appropriations for the purpose of improving through routes.

Western Massachusetts.

In 1914 the Mohawk Trail was completed and opened to travel, connecting Greenfield with North Adams over one of the most beautiful scenic routes in New England. The construction of the 16 miles over a new route is fully set forth in the report for 1914.

As was stated in last year's report, this road, in common with many others, was damaged by extraordinary cloud-bursts. This damage has been repaired, and in many places the retaining walls and rip-rap along the rivers have been either rebuilt or strengthened. The road has been oiled, and has been kept patched and reshaped.

It is impossible to keep in good condition a road constructed merely of the "best material available," when no good gravel is obtainable; but for a summer road it has been kept in reasonably good condition. It has been used by a very large number of motor cars daily during the season. It was reported that over 3,500 motors coming from many States went over the trail in one day; and on many days, when the weather is fine, it is used by 1,000 to 1,500 motors.

Charlemont.

The gap between the bridge over the Deerfield River and Charlemont village, a distance of about 2 miles, which was constructed as a gravel road last year, was coated with oil this year.

About 2 miles of gravel road east of the village has been constructed this year.

A State highway was laid out this year over the remaining $4\frac{1}{2}$ miles east of Charlemont village on the road toward Shelburne Falls. When the construction of this is completed it will

fill in the gap between Charlemont village and Scotts bridge, where it joins the State highway in Buckland leading to Shelburne Falls. Over 2 miles of gravel road, 18 feet in width, has been constructed. This will be coated with light oil.

The Commission has carefully considered the desirability of laying out the road on an entirely new location, further back from the river and on higher land, because the present road is occasionally flooded, especially when there is an ice jam. Some winters the ice from the river has been forced up over the road many feet in height, and a way has had to be cut through in order to allow any vehicles to get over the road. Such occurrences have been only occasional, however, and the high water has usually not lasted many days.

Surveys and estimates were made over several different lines, as well as over the existing road. The relocation of the road on the back land away from the river meant that the main road, on which there were quite a number of residences, the church, graveyard, etc., would be left for the town to maintain.

A good deal of opposition developed to having any back route followed. The selectmen and citizens were seemingly unanimous in wishing to have the State highway follow the old road. Another consideration which influenced the Commission in its decision was that the old road had a number of large and beautiful trees, making it a beautiful drive along the river.

So far as the use of the road by the general public was concerned, they used it only in the summer time; but so far as the citizens of the town were concerned, they had to use it in winter, and would have to suffer the inconvenience. The law requires the town to clear the road of ice and snow sufficiently to accommodate the traffic.

Taking all things into consideration, the Commission decided to follow the old road, merely improving the alinement, and widening the location where necessary.

Where the road is at all likely to be flooded or covered with ice from the river, the surface will be made of gravel mixed with an asphaltic oil product and spread upon the road. It seems probable that such a surface will not be washed away even in time of floods, and the few defects that may come can be easily repaired.

The whole road, even where construction was in progress, has been kept in reasonably good condition for a country road.

The Commission has allotted \$60,000 for the completion of the 2 miles east of Charlemont village, which was laid out last year but constructed this year, and for the construction of the $4\frac{1}{2}$ miles which was laid out this year.

There was a very narrow, dangerous bridge over the Fitchburg Division of the Boston & Maine Railroad just beyond Scotts bridge, and on the approach to the State highway in Buckland. The bridge was too narrow for two vehicles to pass on it, and the two approaches had very sharp, blind curves. The county commissioners of Franklin County ordered the bridge to be widened and the approaches to be improved.

This improvement was made by the railroad company this summer, the work being well planned and expeditiously executed, so that the traffic had to use the detour only for a very short time.

Shelburne Mountain.

The existing road over Shelburne Mountain has been improved from time to time by the Commission, in co-operation with Greenfield, by using money from special appropriations made by the Legislature and by the use of motor vehicle fees.

It has been kept in reasonable condition by constant maintenance, but with the money available only an ordinary country dirt road could be built, as no gravel could be obtained, and it was practically impossible to avoid some 12 per cent. grades, with quite long stretches with grades exceeding 7 and 8 per cent.

To seek a line with better grades several lines were run and a new route found on the north side of the present road, which started near the foot of the mountain in Greenfield and skirted along the bench to the north, and turned westerly on fairly easy grades, joining a road which could be used after it had been widened and improved, and coming out on the present road some little distance westerly of the mountain.

It is entirely practicable to construct a highway over this route, which is about 4 miles long but has easy grades most of the way. There would be less than 1,400 feet of 7 per cent. grade, and a little over a mile of 6 per cent., and all the grades

for the remainder of the way would be 5 per cent. or less. This would be a great improvement over the present road with its maximum grade of 12 per cent. A rough estimate of the cost of constructing these 4 miles of new highway would be from \$80,000 to \$90,000.

The Commission is now having a survey made over a possible route on the south side of the present road, to ascertain if a still better or more economical route can be secured there.

While it is not of vital importance that this new road be built at once, the Commission feels that being upon a main trunk line, and used by 1,000 or more vehicles every pleasant day in summer, a better and safer road should be constructed in a few years over whatever is the best route, and that meanwhile the old road can be kept shaped and open to travel.

Pittsfield to Albany.

The only stone that was available within any reasonable distance for the portion of this road over Lebanon Mountain in the town of Hancock was of very poor quality. The road was resurfaced with this stone and a bituminous binder was used in 1911, but it was never in good condition. The traffic over it was so heavy that it was often rutted, and potholes developed constantly. It was a long up-hill haul from the railroad. The old macadam was only 15 feet in width and had an excessive crown.

The Commission therefore decided to construct about $1\frac{1}{4}$ miles on the worst section of the road over the top of the mountain, and a cement road 18 feet in width was built. This was completed this fall. The cost of this work was something over \$25,000. Meanwhile the through traffic had to use a detour through the town of Richmond.

Pittsfield-North Adams.

This route is practically completed so far as State highway is concerned.

About $1\frac{1}{4}$ miles of the State highway in North Adams on the road to Williamstown was in poor condition. This road, either on account of the heavy traffic or because of an insufficient

foundation, has not worn well. It was constructed as a water-bound macadam road in 1896-97. The top was resurfaced for a portion of the way with broken stone in 1905; in 1909 the road was coated with asphaltic oil; and in 1911 the whole road had to be resurfaced and more stone put on, coated with asphaltic oil.

This year the Commission decided to reconstruct about $1\frac{1}{4}$ miles that were in bad condition, substituting a cement road 18 feet in width for the old macadam.

Williamstown-Pownal.

The road from Williamstown north into Vermont and through Pownal is a main trunk line much used by motors going up into the State of Vermont and also by cars that are going to Troy, N. Y. It has been in extremely bad condition, and the Commission agreed to lay out a section of State highway on that route. It allotted \$15,000, and the work was advertised. Very few bids were received, and they were all so high that the Commission deemed it best to reject all bids and delay the work until next year.

Williamstown-Pittsfield.

The road south from Williamstown through New Ashford and Lanesborough is one on which the Commission has been co-operating several years. The Legislature has made special appropriations for use on this road, and the Commission and the county of Berkshire have co-operated in New Ashford and Lanesborough.

In Williamstown the town and the Commission have co-operated, each bearing one-half the expense of constructing a water-bound macadam road, with a foundation where necessary, in 1912, 1913, 1914 and 1915, about $4\frac{1}{2}$ miles of road having been constructed between Williamstown and South Williamstown. The road was coated with light oil this year, the town and the Commission sharing the expense.

This year the Commission had an understanding with the town that the continuation of this road to the New Ashford line, about $2\frac{1}{4}$ miles, would be constructed by the Commission and town jointly.

The town appropriated \$4,000 toward the cost of constructing the road from South Williamstown to the New Ashford line, and the Commission allotted \$4,000 to go with it.

It was decided to postpone the work until next year, when it was expected that the town would make another appropriation which the Commission would match, so that enough money would be available for a reasonably large contract.

Work was done on this route in New Ashford and Lanesborough last year, but very little was done this year beyond keeping the road that had been constructed in good condition.

Before this route is completed there are quite a large number of small bridges and culverts that will have to be constructed, and also several miles of road that will have to be built.

Pittsfield to Springfield.

The road in Becket has been open to travel all summer. Three small bridges, which had been replaced with new concrete bridges of greater width, were opened to traffic in the spring. Certain portions of the road were widened from 15 to 18 feet, and curves banked and widened to 21 feet. The whole road has been kept oiled and patched.

The traffic over this road, known as "Jacob's Ladder," is becoming so heavy that the surface is wearing out on a number of miles, the local stone of which it was built being soft, and a few miles surfaced only with gravel.

All these poor sections should be widened to 18 feet, and resurfaced. This will cost a very large amount of money. Up to the present time other more important roads have seemed to require more prompt attention. Also, there are few good detours, so the Commission decided to try to maintain the road in as good condition as possible and keep it constantly patched and open to travel.

If this is continued for a few years, until certain other routes under construction are completed, then the traffic may use the new routes while this one is under construction.

One detour would be via Becket and Washington through Hinsdale and Dalton to Pittsfield. Also, before many years the road from Northampton to Pittsfield via Goshen, Cummington and Windsor will be in reasonably good condition and may be used as an alternate route.

Pittsfield South to Connecticut and New York.

On this route Monument Mountain, so called, between Stockbridge and Great Barrington, has needed improvement for many years, not only because of its bad grades, but because of its narrow width and bad curves. The road was on the side of the mountain, with only a guard rail to prevent the vehicles from falling.

A number of survey lines were run to find the best location for a new road. A new location was found where the road could be constructed with grades not exceeding 6 per cent. This started from the old road at the foot of the mountain and went over a new location on the easterly side for about a mile, joining the old road at the top of the hill. To secure reasonable grades required a large amount of earth and rock excavation and a considerable amount of filling, making the construction expensive.

Estimates of the probable cost were made and presented to the town. The town voted to appropriate \$10,000 toward the cost of construction, and to assume and pay all the land and grade damages. The Commission laid the road out as a State highway and allotted \$20,000. Late in the summer a contract was let for the construction.

The work has progressed extremely well, and is one of the few jobs on which the progress has been satisfactory this year. All the grading and excavation are done, and all culverts are in. The bottom course of local broken stone is in place for over 3,000 feet in length. The soil conditions are extremely bad in this section, so that a stone foundation is necessary.

When the contract was let the Commission intended to use only local stone in the construction of the road. As the work progressed, however, it became evident that the stone was not suitable for the top course. It is a peculiar stone, being extremely hard but excessively brittle. The Commission therefore decided to use an imported trap rock for the top surface of the road, using the local stone only in the bottom. This will, of course, considerably increase the cost of the road.

Sheffield.

From Great Barrington south there are two main routes through Sheffield: one, the "middle road," connecting with a main route to points in Connecticut, and the other going through South Egremont and down through the "Under Mountain Road" in Sheffield, connecting at the Connecticut line with a main route passing through that State, and down through West Chester County over a main trunk line in New York to New York City.

The southern end of the "middle road" has been constructed and improved as a gravel road, the Commission and the town co-operating.

The highway leading from Sheffield north to Great Barrington is to be built under the provision of the "western county bill" and will be described under that heading.

The Commission has been constructing a gravel road on the "Under Mountain Road" for several years past, the work usually being done by the town, using local labor and teams. This work has been continued this year, the Commission having allotted \$12,000 to continue the road northerly to the Egremont line. Progress has been extremely slow and unsatisfactory, — less than three-quarters of a mile being completed, — so the Commission decided to stop the work and put the road into reasonable condition for traffic. There will still be about 2 miles from the Sheffield line to South Egremont that will have to be constructed.

There is another road that the Commission has been working on leading from South Egremont over "Molasses Hill" to the New York State line, where it connects with a State highway going to Hudson, N. Y.

The Commission has already constructed the road over the hill, but about 1 mile of ordinary country road remains between the improved road and South Egremont.

From North Adams to the Vermont Line.

This route was completed last year from the end of the State highway in Clarksburg northerly to the Vermont line, the Commission and the town co-operating in constructing a gravel road.

Connecticut Valley Routes.

The main routes from Springfield south to the Connecticut line have been completed for several years.

From Springfield north to Greenfield on the west side of the river via Northampton there was an uncompleted section of road about 2 miles in length. This has now been completed, the city of Northampton having paid for the construction of about three-quarters of a mile of road, and the Commission having laid out about $1\frac{1}{2}$ miles of State highway that had not been constructed, taking over and repairing a section that had been constructed by the city of Northampton a year or two ago. This completes the road to Greenfield on the west side of the river.

On the east side of the river the road through the "Notch" in Granby and South Hadley has been completed. It was constructed of trap rock, and a most excellent road was built. It was coated with light oil this year, as were other sections of the road.

This completes the route on the west side of the river via Chicopee, South Hadley and Amherst, through a part of Sunderland to South Deerfield, and so on to Greenfield.

In Sunderland the Commission co-operated with the town in building about 1 mile of road running northerly from the Hadley line toward the village of Sunderland, a macadam road being constructed. The town appropriated \$5,000, and the Commission allotted a like amount in the first instance and later allotted \$1,400 more, as the cost of the work exceeded the estimate, and also because the road had to be coated with light oil to preserve it.

From Greenfield north to the Vermont State line a gravel road has been constructed through Bernardston for a portion of the way on the west side of the river.

The road to the New Hampshire line through Northfield was completed before, and has been kept constantly maintained and in good condition.

A portion of the old State highway through Northfield was resurfaced and widened this year, a tar penetration macadam surface being constructed and about 1 mile being resurfaced.

This road was an old water-bound macadam road, built in 1901 and 1902, which had been maintained with an asphaltic oil surface for the last few years; it was rapidly breaking up and being disintegrated by the traffic.

Greenfield and Fitchburg to Boston.

The whole route, except for a few village streets, has been improved.

The town road in Greenfield, going down the hill to the bridge over to Turners Falls, is quite narrow, and there are two blind, abrupt corners at the top of the hill. The Commission has considered this road to be dangerous for many years, and has been trying to get either the county or the town to improve the conditions there, not only by widening but by relocating the road on the two corners. This year there were several bad accidents there.

The bridge over the river is an old suspension bridge, and is not in very good condition and should be rebuilt. Committees have been appointed to take up not only the question of constructing a new and stronger bridge, but of improving the highway as well, and the approaches on both sides, in Montague and Greenfield. Three or four different schemes have been suggested, some of them involving the building of a highway on a different location, the location of the bridge being altered.

The Commission had a conference on the ground with representatives of both Greenfield and Montague, as well as with the Franklin County commissioners.

It was agreed that a study should be made, with the idea that, when it was determined what had best be done, it might be possible to secure the improvement by co-operation between the towns of Greenfield and Montague and the county of Franklin, and that possibly this Commission might help by laying out and constructing some of the highway.

The old State highway in Montague between Turners Falls and Millers Falls was constructed twenty years ago, and other portions ten years ago. Certain portions had been lightly resurfaced, but the road was getting thin and required a considerable expenditure for maintenance to keep it passable, and most of it needed to be resurfaced.

A contract for the work was let, and the work was started early this spring. Nearly $2\frac{1}{2}$ miles were resurfaced, trap rock being used, penetrated with an asphaltic product applied hot under pressure. This work cost over \$19,000. The road was open to travel in the late summer. The road was widened about 5 feet for about 1,200 feet more, at a cost of about \$1,000.

In Phillipston, on this same route, a section of old State highway about three-quarters of a mile long was resurfaced, the same materials being used.

On the other side of Fitchburg, in Lunenburg, a section of old State highway 3,000 feet long was also resurfaced, the same materials being used.

Beyond this, in Shirley, a most excellent road made of a mixture of gravel and an asphaltic product was completed and opened to travel last year.

There is a short stretch of extremely poor road in Ayer, running from where the State highway ends at the beginning of the village to the main road near the depot. The Commission has been trying to get the town to construct this short piece of road for several years, and has offered, if the town would do this, to lay out and construct as a State highway a considerable length of this road which is in bad condition.

There are about $2\frac{1}{2}$ miles of road in Ayer, leading from the Littleton line toward Ayer, which were improved as a gravel road a good many years ago by the town in co-operation with the Commission. This road was entirely satisfactory and wore well as long as it was only used by the local teams, but during the last few years it has become a main through route, and is probably used by over 500 motor vehicles a day during the summer season, and it has therefore been rapidly wearing out and getting into bad condition.

During the winter this particular road broke up badly. Automobiles and motor trucks were stalled and had to be hauled out. The road became impassable. Finally, the town had to close it altogether for several weeks.

The town finally agreed this fall to construct the short stretch of village road on the west end of the village, and thereupon the Commission let a contract for the construction of a State highway from the Littleton line westerly for a

distance of over 2 miles. The contract was let in November, so that very little if any work will be done this year, but it expects to get the road constructed early next summer.

There is some town road in Littleton that needs improvement, and the Commission hopes to make some arrangement with the town, and possibly with the county of Middlesex also, whereby the whole road can be improved by the co-operation of all the parties interested.

The whole road from Littleton to Boston via Concord has been improved.

A number of miles of the State highway, especially in Acton, built many years ago as a macadam road 15 feet wide, has become thin and needs to be resurfaced and widened, but other roads have seemed more important, and the Commission has not been able to secure enough money to resurface and widen more than a small percentage of the old roads that need it each year.

A portion of the State highway between Concord and Boston was resurfaced last year.

All the rest of the road should be widened and resurfaced, because it is rapidly wearing out and requires a large expenditure every year to keep it in even passable condition. Every spring it is more or less broken up and rutted and pot-holes develop constantly. It was resurfaced with trap rock seven or eight years ago, but the traffic is so heavy and is increasing so rapidly that it needs resurfacing again. This road has a very large team traffic of farmers' wagons, and it is now also being used daily by large and constantly increasing numbers of heavy motor trucks, to say nothing of the thousands of automobiles constantly going over it.

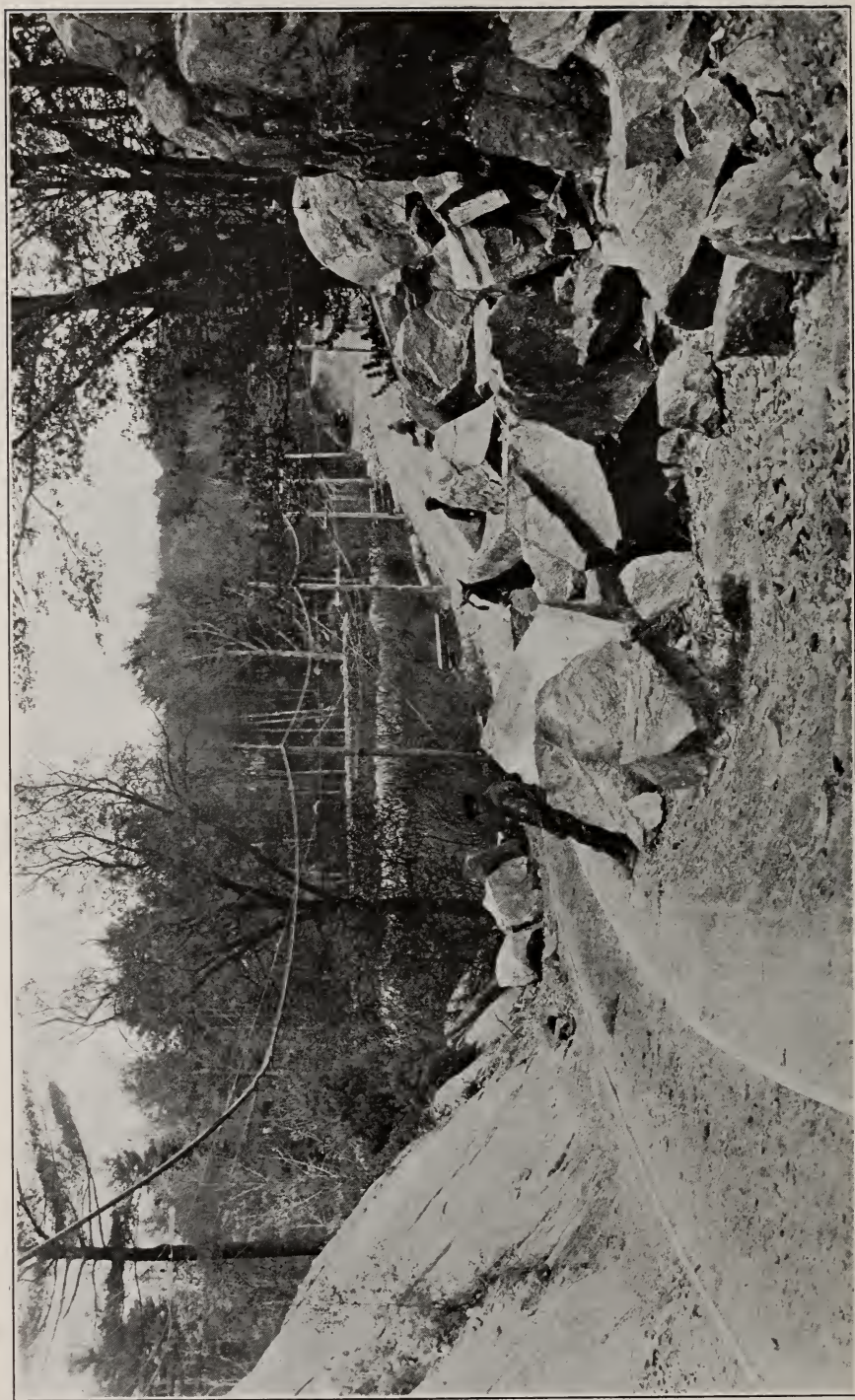
The present State highway ends in Lexington at its junction with Massachusetts Avenue.

Possible New Route into Boston.

In Lexington the Commission is co-operating with the town in constructing the highway leading toward Arlington, to meet a new highway that is being constructed there. This requires the construction of a piece of highway about 1,800 feet long, on a new location. The Middlesex County commissioners



A Finished Section of Bituminous Concrete in Gloucester.



Heavy Ledge Work in Gloucester.

have co-operated by making a layout, and widening the corner at the junction of Maple and Lowell streets.

In Arlington the town and the Commission are co-operating in the construction of this new highway, largely over a new location in a sparsely settled portion of the town, the agreement being that the town would lay out the road, pay all land and grade damages, put in all the necessary drainage, do the grading, build the sidewalks where there were any, and when this work had been completed to the satisfaction of the Commission it would pay for and construct the surface of a roadway 18 feet in width, made of bituminous macadam or of some stronger material.

The same agreement was made in Lexington as to the short piece of new highway that is being constructed to connect with the Arlington road.

In Arlington the town work began last year and has been continued this year, and is nearly completed and ready for the Commission to do its part in building the surface of the traveled portion of the way.

A contract was let this fall for the construction of the surface of the highway in both Arlington and Lexington.

When these highways are completed, the traffic coming from Concord to Boston may keep straight across Massachusetts Avenue and follow Maple Street for about half a mile, then swing to the right into Lowell Street and continue along over the new highway that is being constructed. It will then continue along the new highway in Arlington down to or near the metropolitan parkway leading to Medford and Somerville. It is expected that the short connection needed here will be constructed in the near future.

This will take the automobiles and through traffic out of the congested parts of Massachusetts Avenue at Arlington Heights and at Arlington Square, these points now being very dangerous because of the large number of people getting on electric cars.

Fitchburg to Keene, N. H.

The road from West Fitchburg to FitzWilliam, N. H., is the most direct route from Boston to Keene, N. H., by what is called the River Road.

The city of Fitchburg has co-operated by constructing a new piece of tar macadam highway on this line, so there is now a good road, with very little grade, from Fitchburg to the New Hampshire State line.

There are about $2\frac{1}{4}$ miles of this route in Westminster, about 6 miles in Ashburnham, and about 7 miles in Winchendon, of which approximately 1 mile is in the village. About 14 miles in all were improved.

The county co-operated in the building of the road through Westminster, and the town of Ashburnham co-operated in that town. In Winchendon the town and the Commission shared the expense of construction.

It was evident that in the towns, especially in Westminster, where the road is of little interest to the town, the road would not be maintained and kept in good condition. Consequently, the Commission laid out the whole highway that had been improved as a State highway, and since then has had it kept constantly patched and maintained by its maintenance force. There is about 1 mile in the village of Winchendon that was not included in the State highway layout.

Boston to Dublin and Keene, N. H., via Groton.

This route is constructed as far as Littleton, and is covered elsewhere in this report.

From Groton westerly there is some old State highway running through Pepperell, Townsend, Ashby, and a short stretch in Ashburnham to the New Hampshire State line at Ringe, where it connects with a New Hampshire State highway going to Dublin, N. H.

The road in Ashburnham has been improved with special appropriations made by the Legislature in 1914 and 1915, and the work done is described in this report under "Work under Special Acts."

Some of the older State highway in Ashby and Townsend was worn out, and this has been widened and resurfaced during the last two years with a top surface of broken stone penetrated with asphalt.

Littleton-Groton.

The only bad section on this route is between Littleton and Groton, which is a town road.

The main route to Fitchburg has been constructed on a line via Ayer, Shirley and Lunenburg.

The main route to Keene, N. H., has been constructed over as short if not a shorter route, via Fitchburg, Westminster, Ashburnham and Winchendon as set forth above. This route not only included the city of Fitchburg, but it had better grades and good material, and was not only much less expensive, but could be and was built in a much shorter time. Consequently the route via Groton became only a secondary route at best.

The subject of improving the road between Littleton and Groton has been considered several times with the Middlesex County commissioners, and they have expressed themselves as quite ready to have the county pay its share. There are about $6\frac{3}{4}$ miles of road that should be constructed, of which $2\frac{3}{4}$ miles are in Littleton and 4 miles in Groton.

The Commission has offered to contribute toward the cost of constructing the road, on the basis of the State, county and town each paying one-third.

Springfield to Worcester.

On this route the traffic has become so heavy, especially with the large increase in heavy motor trucks, that the road was breaking up in many places and was in bad condition.

This was especially true of about 2 miles through Wilbraham. A contract was let for the construction of a cement concrete road, 18 feet in width and about 2 miles in length. The road has been constructed and is open to travel.

Some of the old broken stone that was taken out of the old road was used in making a 3-foot shoulder on the side of this concrete road, and a part of it was used in widening to 18 feet the macadam surface on over 2 miles of the old State highway that was not resurfaced, the curves being banked and widened to 21 feet. Some of the worst curves and corners have been banked, widened and improved in Palmer and Warren.

In Warren a section of town road about 400 feet long, on a grade, was constructed of granite block paving, the town paying a quarter and the Commission three-quarters of the expense. This had been a very bad section of road and extremely expensive to maintain.

The road through Spencer, for which the Commission allotted \$9,500 from the motor vehicle fees last year and the town appropriated \$19,000, was completed early in the year.

Worcester-Boston.

This route was completed some years ago, but the old macadam road, 15 feet in width, was worn out, broken up in many places, and was inadequate for the present traffic.

Practically the whole route, like many of the older roads, required widening and a much stronger road surface; a foundation was needed in many places, and very many corners and curves should be widened, banked, and the view improved.

Sections of this road have been widened and surfaced during the last few years, this work being done as rapidly as money could be made available.

The resurfacing was practically completed to Wayland last year, and a section had been resurfaced beyond in Sudbury, nearly $2\frac{1}{4}$ miles long. At the bad corner in Wayland Center the county commissioners of Middlesex County have made a new layout, are moving a building, and the Commission is widening and relocating a portion of the State highway. The corner is much improved.

On the east side of Marlborough a section about 1 mile long was widened and resurfaced. On the road leading out of Marlborough toward Northborough, the Middlesex County commissioners and the officials of the city paid for a relocation of the highway and a widening at a bad corner, the Commission having agreed to lay out and construct a short section of State highway there. The improvement was made, a contract let, and a cement concrete road has been constructed about 980 feet long and 24 feet in width.

On the old State highway farther west there were some bad curves, and the Middlesex County commissioners have co-operated there by making a taking and paying the land damages.

The Commission widened and banked the road on these curves, so that they are now comparatively safe.

In Northborough on this same route over $1\frac{1}{4}$ miles of road were resurfaced and widened.

In Shrewsbury the resurfacing and widening was continued, nearly 2 miles being improved.

In all these places a foundation was put in where it seemed necessary or where the road had broken up. New stone was added where necessary, the road surface was widened to 18 feet, except on the curves, where it was made at least 21 feet in width, the whole curve being banked. The road surface was made of 3-inch broken stone thoroughly rolled, trap rock being used; it was then grouted with a hot asphaltic product applied by a pressure machine, usually about 2 gallons of asphalt being applied to each square yard of road surface. This was applied in two applications, the first being about $1\frac{1}{2}$ gallons of asphalt to the square yard; after this was applied, $\frac{3}{4}$ to $1\frac{1}{2}$ inch stone was spread very evenly and well rolled, and a half gallon of hot asphalt was applied under pressure. This was thoroughly covered with peastone or chips and sand, and was well rolled.

On the steeper grades the larger stones were well rolled and a mixture of sand and tar was poured in to fill the voids, and the road surface left somewhat open and rough in order to provide a less slippery surface for horses.

The Commission hopes that this type of construction will last, but it has some doubts, because it fears that the stone may begin to ravel or come out, and that then a bituminous surface will have to be put on to prevent the road from being destroyed.

Over \$100,000 was expended on this route last fall and this year for the widening and resurfacing of these stretches of highway, and about \$8,000 has been expended in the construction of new State highway. The widening of these stretches of road cost over \$26,000, and the short stretch of road where the old State highway was relocated cost over \$4,800. This was because the land was low and marshy, and a large amount of filling was necessary and a new culvert had to be constructed.

There still remain a considerable number of miles of old road on this through route that should be widened and resurfaced.

When the Commission let the contract for some of this resurfacing, especially in Sudbury, it was provided that the contractor should resurface only half the width of the road at a time, keeping flag men at each end and letting the traffic through in single file. Early in the spring when there was but little traffic, this was possible, although it slowed up the work very materially. When the heavy summer traffic began, however, the road became so congested and so many automobiles were always waiting at each end, that there was almost a continuous procession. They kept the sub-base constantly rutted and rough, and almost prevented the teams from getting there that had to haul the material on to the road so that it could be built. It also caused long delays and many complaints, not only from the contractor because he couldn't do his work, but from the motorists themselves.

Consequently, when the Commission found that very little work could be done under these conditions, and that the public would be incommoded for a long time if such a policy were continued, it decided to detour the traffic for a few weeks over a local road which it helped the town to improve and make safer.

As soon as this was done the rate of progress on the road about trebled, the contractor being able some days to secure and place 300 tons of stone a day, whereas while the traffic was using the road it was often impossible to spread as much as 100 tons a day.

The Commission has since allotted some money from the motor vehicle fees fund to help the town of Sudbury repair the damage that was done to its local gravel road by the large traffic that went over it.

On the whole, the Commission thinks that on a main through route of this character, with such a heavy traffic, the public is less inconvenienced and is certainly incommoded for a much shorter time if it is sent over a detour, even over an ordinary country road, rather than allowed to go through a road that is under construction, as there is seldom or never width enough on the traveled portion of the highway for more than a single vehicle on the side. It is impossible to have room to pass, and there is constant delay because of the slow-moving teams which have to bring the material to the road.

Fitchburg and Worcester to Providence.

This route is practically completed, so far as the State highway is concerned, from Fitchburg to Worcester, a section of highway having been constructed in West Boylston last year, the town contributing \$4,000 toward its construction.

South of Worcester, on the route to Providence, there still remain quite a few miles of poor road in Northbridge and Uxbridge before the State highway is reached.

In Northbridge the town has been co-operating with the State and appropriating \$4,000 every year since 1913 for work on this road.

In 1914 and 1915 the Commission built a cement concrete road, 18 feet in width, in Northbridge on this route. This year the town again appropriated \$4,000 to go with the money allotted by the Commission, and a section of State highway about $1\frac{1}{4}$ miles long was laid out. The same construction is to be continued. A contract was let in July, but there were quite a few changes that had to be made in the grade. The road was widened and relocated in places, and street railway tracks had to be moved, — all of which caused delay as did also the scarcity of labor.

Quite a little grading has been done, a foundation has been put in for a considerable distance, and the road has been opened for travel for the winter. The concrete surface, 18 feet in width, will be laid early in the spring. The Commission has allotted \$25,000 for the construction of this road.

In Uxbridge there is a long stretch of road through the village that should be constructed, and the Commission has offered to pay one-third of the cost out of the motor vehicle fees.

On the south side of the village there is a stretch of road where the town and State had co-operated in constructing a gravel road quite a few years ago. As the traffic increased this road wore out and became rough. A gravel surface was entirely inadequate to carry such heavy traffic, especially the motor trucks.

On this section of road the Commission offered to co-operate to the extent of paying two-thirds of the cost of constructing a stronger road. The town appropriated \$3,500, which was one-

half the estimated cost of constructing a road with a mixed gravel and asphalt surface. After a careful consideration of the probable future traffic, the nature of the subsoil, etc., the Commission decided that it would be more satisfactory and economical in the end if a cement concrete road, 18 feet in width, were constructed, as was being done in Northbridge. This will, of course, cost a good deal more money in the first instance, but will, the Commission believes, be economical in the end.

A contract was let for the construction of 3,700 feet of State highway. The grading and widening have been done, and a considerable length of the concrete surface has been laid. The work had to be stopped, however, when the cold weather came. It will be finished as early in the spring as the weather permits.

The Commission expects that both Northbridge and Uxbridge will co-operate in the future, and that the whole of this important main through route will be completed in about two years.

The worst stretches of the road have been improved first, so that, except when the frost is coming out of the ground, the whole route is in reasonably good condition.

Worcester to Douglas via Sutton.

The town of Sutton and the Commission have been co-operating for the past five years in the construction of the road leading to Douglas.

A water-bound macadam road has been constructed, local stone being used. This work was continued this year, the town and the Commission each appropriating one-half the money.

On a part of the route the road was relocated in several places to eliminate some bad corners and improve the grade. In many places the soil was clayey and wet as well, so that a stone foundation and considerable drainage had to be put in, making the construction quite expensive.

The town and Commission each contributed \$10,000 this year, the town taking the contract and subletting it.

Over a mile of road has been completed, and some grading done beyond. About 8,000 feet will be constructed with the money available, leaving about half a mile to be built before the State highway is reached. This will undoubtedly be constructed next year if the town will continue to co-operate.

The Commission does not recall any town in the Commonwealth that, considering its wealth (\$1,600,000 valuation), has done as much as the town of Sutton to improve its roads or appropriated as much money. It deserves credit for the public spirit it manifests.

Worcester and Wrentham to the Cape.

Much work has been done on this route in past years. There is a State highway to Grafton, where it connects with Route No. 13 of the western county bill, which covers the road in Grafton and Upton to Milford.

A considerable length of road has already been built, and the work is under contract and is going on in Grafton and Upton. This work is described elsewhere in this report under work in the western counties, Route No. 13.

In Milford there is a stretch of State highway.

State highway or improved road has been built on this line in Milford, Bellingham, Franklin, Wrentham, Foxborough, Mansfield and Norton, at the joint expense of the State and the towns.

Last year the Commission constructed about $2\frac{1}{2}$ miles of State highway on this route in Wrentham, to connect with the State highway in Foxborough. Beyond this the highway on this route has been improved in Foxborough, Mansfield and Norton to the village.

The road from Norton to Taunton is being constructed in Norton in part with special appropriations made by the Legislature and in part by this Commission from its construction fund. About 2 miles of concrete road was built this year, and is described elsewhere under "Work under Special Acts."

At Taunton a connection is made with the main highway to Fall River, to New Bedford, and so on through Marion, Mattapoisett to Wareham and all points on the Cape, or to Middleborough and from there to Plymouth and all South Shore points.

Boston to Lowell via Billerica.

Nearly 12 miles of State highway have been constructed on this route in Winchester, Burlington and Billerica. About 3 more miles of road have been constructed in Billerica on this

route, the first portion being built jointly by the town and the State; for the last three or four years the county of Middlesex has paid one-third of the cost.

This year the county, town and State have each allotted \$2,500 for constructing a section of road northerly from where the improved road ends. This work is now in progress.

The city of Lowell has constructed a good paved street to the Chelmsford line on this route, and last year the county of Middlesex relocated and widened the road in Chelmsford, and a State highway about 1 mile long was laid out and constructed through that town to the Billerica line.

A cement concrete road, 18 feet in width, was constructed, the concrete being completed late in 1915, and the slopes, shoulders, etc., being completed this year.

The Commission had agreed, if the county and town would co-operate in building on the southerly end of this route in Billerica, to lay out and construct a section of State highway on the northerly end. There were several possible routes and bad turns, so that surveys and estimates had to be made on various lines before it was possible to tell which was the best one.

The county commissioners and the town officials were consulted, because it was understood that they must furnish a location and pay all land damages. This caused so much delay and all bids were so high this fall that the Commission decided to delay the work until another year. This whole route will be completed in another year or two at the most, if the county and town continue to co-operate.

Important Cross-country Routes.

The county of Middlesex and the Commission have been co-operating in building the road from Billerica to Bedford in Billerica, and from Bedford to Concord in Bedford. On the road in Billerica work has been going on for several years with the co-operation of the county. This year the work was continued, an asphalt penetration macadam being constructed.

At first the county, town and State each agreed to appropriate \$2,500, which sum it was expected would complete the road to the Bedford line. Labor and materials were so much higher

this year that the county, town and State had each to appropriate \$1,700 more to finish the road, making \$12,600 in all.

The road in Bedford from the Billerica line to Bedford was constructed several years ago.

On the road in Bedford leading to Concord work was started last year, and completed this year, about 2 miles of road being built, the county, town and State each paying one-third of the cost.

There are several other cross-country routes that are being improved in this section of the country, in part by co-operation between the county, town and State.

One is the road between Reading and Wilmington, on which about 4 miles in all have been constructed, 2 miles in each town. Work has been going on this year in Wilmington and will probably be continued next year.

Also, in Reading the road leading toward Woburn is being constructed. This year about 4,000 feet were subgraded, ready for a surface next year, when probably the county and town will continue to co-operate.

In Woburn on the road to Lexington a State highway is being constructed, the county, city and State each paying one-third of the cost. In 1915 the city appropriated \$6,000, the county \$4,000, and the Commission allotted \$8,000 for the construction of about 1 mile of road.

Another cross-country route which has been started is the route between Wakefield and Salem and Lynn. Here the county of Middlesex is co-operating in Wakefield with the town and the Commission, and two sections of road have already been constructed. In Lynnfield the county of Essex is co-operating with the town and the Commission, each paying one-third toward the cost of improving the road to Wakefield.

Boston to Lowell via Tewksbury.

This route from Woburn through Tewksbury is practically completed so far as State highway is concerned. The end of the road in Lowell and Tewksbury is from eleven to sixteen years old, is practically worn out, and needs to be widened and resurfaced.

This year about one-quarter of a mile was widened and resurfaced in Lowell, and about 1 mile was done in Tewksbury, a broken-stone road being constructed, this being penetrated with a good quality of an asphaltic product.

Other Routes in the Neighborhood.

There has been quite a demand for the construction of a road from Andover to Lowell through Tewksbury. In Andover the county of Essex co-operated last year and this year. Last year the town, county and State each put in \$2,000, which was expended in constructing a tar penetration road over half a mile in length. This work has been continued this year, the town, county and State each appropriating \$2,500.

In Tewksbury on this same route the Commission took the matter up with the selectmen, to see if the same co-operation could not be secured there. The Middlesex County commissioners agreed to co-operate. The town has appropriated \$3,000, and the county and this Commission have each agreed to contribute \$3,000.

The town's money was appropriated so late in the season that no work could be done this year. It is hoped that another appropriation will be made by the town next year, so that a considerable length of road can be constructed.

Lowell West to Pepperell and Groton.

On this east and west route in the northern part of the State considerable work has been done. There is a State highway as far as Tyngsborough. A gravel road has been constructed all through Dunstable by the town and the Commission under the "small town" act and with motor vehicle fees.

This year the Commission allotted over \$800 to have the road oiled with light oil, the town shaping and patching the road and applying the oil.

Last year and this year the Commission co-operated with the town under the "small town" act in building a gravel road leading northerly to Nashua.

This year the county of Middlesex co-operated also, the town and county each putting in \$400 and the Commission allotting \$400 from the "small town" noncontributing fund.

On this route a gravel road has been constructed in Pepperell from the Dunstable line to the village, and this year the work was continued on the road leading toward Groton, about three-quarters of a mile of gravel road being constructed under the "small town" act, the Commission and the town each putting in \$700. Good gravel is quite plentiful in this section, so that considerable road can be built for a small amount of money.

Boston to Lawrence.

The construction on this route via Reading and Andover has been practically completed, but the old State highway, some of it built in 1898, was originally of water-bound macadam 15 feet in width. Practically all the older stretches of road needed to be resurfaced and widened. In 1914 the State highway in Stoneham and a portion in Reading were resurfaced and widened. In 1915 about $1\frac{1}{2}$ miles more were widened and resurfaced in Reading and about a mile in Andover.

This year the work was continued, $1\frac{1}{4}$ miles more being resurfaced and widened in Reading, and 1 mile more in Andover. In Andover one-half a mile of road which was not resurfaced was widened to 18 feet.

On all of this work the old road was widened to 18 feet, the curves being banked and made at least 21 feet in width.

Where the road was weak or had broken up with frost, a foundation was put in. Except on the grades, where broken stone was filled with tar and sand by the penetration method, the surface was made of a crushed gravel heated and mixed with an asphaltic product.

Lowell to Lawrence, Haverhill and the Beaches.

The possibility of the construction of a new highway in Lowell, to connect with the river boulevard in Dracut, Methuen and Lawrence, is described in a special report made by the Commission to the Legislature last year. Undoubtedly, this missing link will be constructed this year, because, after studying the several possible locations with the Middlesex County commissioners and the mayor and city officials of the city of Lowell, and after estimates had been made, a location has been practically agreed upon by all parties.

The city of Lowell has also agreed to extend, widen and pave, at its own expense, an existing street, so as to make a good connection with the proposed new highway. The road to be built is nearly three-quarters of a mile in length.

An agreement has practically been reached whereby the city of Lowell and the county of Middlesex will pay all the land damages and for all drainage, grading, embankment walls and rock-fill, the city of Lowell paying 75 per cent. and the county of Middlesex 25 per cent. Lowell will also pay for the construction of the sidewalks above the sub-base, the curb and the guard rails, the State to pay for the construction of the hardened surface of the roadway 24 feet in width with a 3-foot shoulder on the upper side, laying out the road as a State highway.

This new highway, when completed, will connect with the State highway or river boulevard that was constructed several years ago in Dracut and Methuen by the counties of Middlesex and Essex and by the State, under authority of special acts of the Legislature.

There were about 2 miles of worn-out road in Methuen, between this river boulevard and the new boulevard in Lawrence and Methuen, which were constructed by the county of Essex and the State. This road was not only in poor condition, but was narrow and needed to be relocated and widened. Surveys and plans were made, and the matter taken up with the Essex County commissioners, who agreed to make the necessary layout and to pay the land damages. This layout has been made.

A contract was let in the spring for the construction of about three-quarters of a mile of this road in Methuen, and this has been completed, a broken-stone road penetrated with an asphaltic product being constructed. A second contract was let this fall for the construction of the same kind of road on the remainder of the road. It is now being graded and the culverts are being put in. It is hoped that the road will be completed early in the year.

This will complete the road between Lowell and Lawrence. The road from Lawrence to Haverhill and so on to Salisbury and the beaches has been completed for a number of years, so far as the State highway is concerned, certain portions of the road in the village sections being in somewhat poor condition.

The Commission in past years has co-operated with Merri-mac, and has used motor vehicle fees to help it construct some of the road on this line.

This year the Commission agreed to co-operate in Amesbury where conditions were very bad, the agreement being that the Commission would allot from motor vehicle fees one-third of the cost of constructing a section of road about 3,600 feet in length, and that the town would appropriate two-thirds of the necessary money.

The town appropriated \$15,000 and the Commission allotted \$7,500. The contract was taken by the town and sublet. An excellent type of bituminous pavement is being laid from curb to curb, except between the rails of the street railway.

The remainder of the road to the beaches, except for a short stretch of village street near Salisbury Square, is already State highway and has been kept constantly oiled, patched and repaired.

Salisbury Beach Road.

The road back of Salisbury Beach, leading from the State highway at the square northerly to the New Hampshire line, was constructed by the Commission in 1912 under the authority of a special act of the Legislature. There was only money enough available to enable the Commission to build a narrow gravel road. The road was oiled and maintained by the use of motor vehicle fees.

This road has been the subject of many vicissitudes. Originally, the rights of way were secured and the necessary takings made by the Salisbury Beach commissioners, acting under authority of an act of the Legislature which the Supreme Judicial Court subsequently held to be unconstitutional. In the meantime the Commission had constructed a highway as directed by the Legislature in 1912.

Then in 1914 the Legislature, by chapter 659, authorized the Commission to lay it out over the same location as that described by the Salisbury Beach commissioners in November, 1912. The Commission was to award land damages and was authorized to assess betterments. This was done, but some legal question having arisen as to the legality of this layout, the

Commission, acting under the advice of counsel, did not lay it out as a State highway until May 31, 1916.

An attempt is being made at the Attorney-General's office to settle up the land damages and to determine what betterments should be assessed by the Commission.

This road is about 2 miles in length. It has to carry a very large traffic during the summer season, and the whole road needs widening and probably should be resurfaced in the near future.

A contract was let for widening the road this year with gravel, the roadway being widened to 27 feet and the gravel being spread 6 inches in depth where there was no gravel, the old gravel surface being strengthened where it was thin.

This width is necessary because there is a car track next to the beach, and small cottages have been built all along the crest of the beach. The automobiles cannot go off the road surface on to the sand because they get stalled, and also cut into the gravel when they attempt to come back on to the road. In consequence, all the automobiles and teams that come to these cottages have to stand on the roadway and block it, and it is therefore necessary to have width enough not only for the two lines of vehicles that are continuously passing every day, but also for the vehicles that have to stand on the gravel surface, there being no room on the beach side of the car track, except in a few places where the owners have built a garage or plank platform.

This gravel and widening cost \$6,500, but will, at any rate, make a foundation whenever it is necessary to put a better surface on the road.

Boston to Newburyport via the Turnpike.

The work on this route has been continuous for the last six years. The road has been widened gradually from year to year, being made 18 feet at least, and a gravel road has been built in eight towns for a distance of about 26 miles. The road has been constantly maintained by section gangs, who have shaped it after heavy rains and kept it constantly patched.

For the last two years, owing to the increased motor traffic (averaging over 800 motor vehicles a day in the summer season), it has been necessary to treat the surface with light oil.

The team traffic in Saugus and a part of Lynnfield is so heavy, and the soil under the road is so poor, that the road breaks up in the spring and becomes badly rutted. This portion of the road should be reconstructed on a stronger foundation.

This year portions of the road were almost impassable when the frost was coming out of the ground. By constant work, however, the whole road was put into reasonably good condition in the early summer.

For this work the Commission has been allotting money from the motor vehicle fees fund, the amount expended by the Commission this year being about \$9,500. Many of the towns have co-operated every year, appropriating money to help keep the road in order. This year Lynnfield spent \$550, Peabody \$650, Danvers \$800, Topsfield \$500, Ipswich \$500, and Newbury \$800. Saugus and Rowley, however, did not co-operate.

The Commission had a conference with the authorities of all these towns this year, and with the Essex County commissioners, with a view to having the expense of maintaining this much-used through route shared in some equitable manner by the towns, the county and the State. It is hoped that this will be arranged for the coming season, since the Commission has not felt that it was fair to other localities in the State to have so much of the motor vehicle fees spent on this one route now that it has been improved.

The county commissioners have intimated that it might be fair for the county to co-operate and pay a part of the expense, and also that the towns should do their fair share.

Boston to Newburyport via Salem, Hamilton and Ipswich.

This whole route connecting with the Revere Beach Parkway is practically completed.

The State highway in Swampscott and Salem was widened to 18 feet and resurfaced, as was a part of the Beverly highway.

The road in Wenham is of water-bound macadam, coated with oil and kept constantly patched and maintained. The same is true of sections of the State highway in Hamilton and Ipswich, though some of the road in Ipswich is only seven and eight years old.

There was a stretch of town road in Hamilton about three-quarters of a mile in length that was a gravel road and was often in bad condition, especially in the spring. The Commission agreed to lay out and construct as a State highway a portion of this road, about 2,300 feet in length, from the State highway southerly, if the town would construct at its expense an equally good road something over 1,500 feet long through the village. This the town agreed to do, and appropriated \$7,500 for the purpose, the Commission allotting \$9,600. At the request of the town authorities the Commission prepared the plans and specifications for the town work, which was done in connection with the State highway work, the Commission having full charge. The contract was let rather late in the season, but the work progressed with unusual rapidity this year. The whole road was completed and opened to travel before the cold weather set in.

The construction was expensive, because a foundation and expensive drainage were necessary in many places.

An excellent road has been constructed, 18 feet in width, made of trap rock grouted with an asphaltic product applied hot under pressure. On each side of this road a gravel shoulder has been constructed from 3 to 6 feet in width, covering the entire space between the shade trees and poles on the side of the road.

In Ipswich the Commission has been widening the old road from 15 to 18 feet, and banking the corners and curves, which are being made at least 21 feet in width. This work was well under way when the cold weather set in. Gravel was used for the widening, with trap rock rolled in on top, which will be oiled in the spring.

The town of Ipswich has constructed a good road through the village. The State highway beyond was one of the old experimental roads made of gravel and asphaltic oil by the layer method. It became quite rough at times, so the Commission had it spiked up and broken stone rolled into it, so that it has carried the traffic and been in very fair condition all this year. The roadway was widened at the same time. The work was done at a relatively small expense.

The remainder of the road in Rowley has been kept con-

stantly maintained and patched, and has been coated with light oil.

The gravel road in Rowley and Newbury will undoubtedly have to be reconstructed of some strong material in the near future, because the traffic is becoming so heavy.

The same is true of the old 15-foot macadam road in Newbury. It should be widened and resurfaced or reconstructed within a very few years, and the same is true of the old State highway in Salisbury village.

Beyond Salisbury village to the New Hampshire line there is one of the old experimental gravel and oil roads, and this road also should be reconstructed, widened and made stronger.

Boston to Salem via Floating Bridge.

This main route, while somewhat hilly, has been largely used by through traffic, particularly this year during the rebuilding of the large bridge between Beverly and Salem and the reconstruction of Bridge Street in the city of Salem.

Traffic had to be detoured, and the best detour is from Beverly over Kernwood bridge, through a portion of Peabody to Salem, and thence over the Floating Bridge Road on the shortest route to Boston (via Chelsea).

The Commission had already constructed the road in Salem, the city of Salem building a short stretch near the high school.

There was a gap of very bad road in Lynn from the Salem line to the Floating bridge. The Commission agreed with the city of Lynn to lay out and construct 2,000 feet of this road as a State highway, if the city would continue the construction of a concrete pavement on the Lynn side of the bridge. This the city agreed to do, taking the contract for the State highway work, the road being completed and opened to travel during the summer.

A broken-stone road, 6 inches deep, penetrated with an asphaltic product, making a most excellent surface, was constructed at a cost of about \$7,600, a foundation and considerable drainage being necessary because the road was located on a hillside on very wet, clayey soil.

The city of Lynn is constructing the concrete pavement beyond the bridge.

The Legislature last year instructed the Essex County commissioners to prepare plans and make estimates for the construction of a new bridge to replace the Floating bridge, which every year sinks deeper and deeper into the pond, the Lynn end often being a foot or more under water in the spring. When this is built there will be an excellent road from Salem to Revere, as soon as the city of Lynn constructs the short piece of road adjoining the General Electric Company's factory, to connect with the new bridge built by the county of Essex and the State highway beyond over the marshes to Revere. From there on through Chelsea there is an ordinary city block pavement.

Salem to Lawrence via Middleton.

The Commission has been working for many years on this route, constructing State highway and helping the town of Middleton, under the "small town" act, to improve the road from the village south.

In North Andover the Commission has been constructing a cement concrete road for the last four years, the surface being at least 18 feet in width, with an average depth of 7 inches.

This work has been continued, and about $1\frac{1}{4}$ miles of this cement concrete road has been built in North Andover from the end of last year's work to the Middleton line. The progress of work on this road has been slow and unsatisfactory, partly because of labor conditions. The last section of concrete was built late in November, and the road will be opened to travel as soon as it is safe, at any rate in December, even if it should be necessary to rebuild the 450 feet of concrete that was laid late in November, which may not set up properly in the cold weather.

This completes one stretch of over 5 miles of cement concrete road. The first section cracked badly, but as yet the cracks are blemishes rather than defects, and it looks as if the road would last a great many years before it will even have to be covered with a bituminous top. The difficulty is to draw the line between spending more than is economical in order to prevent all cracks and not spending enough to secure a perfect surface.

From the Middleton line to the town, a distance of $2\frac{3}{4}$ miles, the State highway has been completed.

Through the village and on to the Danvers line, the road was improved a number of years ago under the "small town" act. It will have to be reconstructed before many years as the traffic increases on this route.

In Danvers about 4,000 feet of State highway have been constructed. A new bridge will have to be built at the Middleton-Danvers line.

There are about $2\frac{1}{4}$ miles of poor road in Danvers on this route, and about half a mile in Peabody before the main road is reached, that will have to be constructed before the route is completed. When finished this will furnish an alternate route from Lawrence to Boston via Salem and so on over the Floating bridge route.

In this same territory the Commission has been co-operating with the town of Middleton, under the "small town" act, in building the road toward Danvers Center. In Danvers the county, town and State have each appropriated \$3,000 this year, and about three-quarters of a mile of tar macadam road was built at the close of the season. It will be completed in the spring.

Beyond this in Danvers there is a stretch of macadam road that was constructed some years ago, the Commission supplying a portion of the money from the motor vehicle fees.

Farther on in Peabody a considerable length of road was constructed, the county, town and State sharing in the expense.

Gloucester to Ipswich via Essex.

On this route, which is much used by tourists who go to the North Shore and around Cape Ann, the Commission has been working for several years.

A most excellent State highway has been built in Essex from the village to the Gloucester line.

Last fall the city of Gloucester having agreed to construct and maintain the road from Gloucester as far as Magnolia Avenue, the Commission laid out a section of State highway and made a contract for the construction of about $1\frac{1}{4}$ miles of mixed gravel-asphalt surface on a foundation of gravel and broken stone, the work costing about \$33,000.

The contract was let in the fall of 1915, and the work was commenced. . . Progress has been extremely slow and unsatisfactory, largely because of the high price and scarcity of labor.

There was very heavy, expensive grading on this section of road. The old road was very narrow; it had extremely bad corners and curves; there was ledge in many places, and there was one bad hill with a steep grade with high ledges on each side. Also, there was a car track on one side that had to be relocated.

The whole road was widened and relocated, the city of Gloucester having assumed all land and grade damages.

The corners were all improved, the hill was cut down on the top and filled in at the bottom to secure a 5 per cent. grade, and the ledges were blasted out to secure a proper width.

The hardened surface of mixed gravel and asphalt was constructed about 19 feet in width, except at the curves, which were wider, and the road was open to travel in the fall.

Another contract has been let this fall for the construction of a little over 3,100 feet of road that remained to complete the road to Magnolia Avenue. The contractor is already at work and has done a considerable quantity of the grading and excavation.

On this section, as well as on the other sections of this road, the Bay State Street Railway Company has co-operated by moving its tracks and paying its fair share of the cost of the widening, grading, etc.

In Essex the road has been improved during the last few years, from Essex village to the Ipswich line, a gravel road being built, under the "small town" act, the town and the Commission co-operating not only in its construction but in oiling this road as well as the roads to Hamilton and Manchester, both of which have been improved in the same manner. This year the Commission allotted \$340 to cover the cost of the oil, the town paying for applying it and covering it.

On this same route in Ipswich the Essex County commissioners, the town and the Commission each agreed to contribute \$1,500 for the construction of a section of gravel road from the Essex line toward Ipswich.

The county is considering the advisability of widening and

relocating the road in certain places, but the layout has not yet been made and no work has been done.

If the county and town will continue to co-operate, a good highway will be secured within a year or two.

Routes, Gloucester and Cape Ann.

This main route diverts from the main route to Newburyport at Beverly, and continues along the North Shore through Manchester, Gloucester and Rockport to the end of Cape Ann.

The city of Beverly has constructed two sections of most excellent highway on this main road, and will undoubtedly construct the remainder of the road in a few years. At present there is a fairly good macadam road coated with oil or tar.

The State highway in Beverly was widened and resurfaced two or three years ago except for about 1 mile on the Manchester end. This was shaped up and coated with cold tar.

Last year the town of Manchester spent nearly \$40,000 and constructed an excellent road from the Gloucester line to the village, under the direction of the Commission and its engineers.

This year it again requested the Commission to make plans and specifications and to supervise the work. A contract was let by the town, and the Commission acted as engineer. A most excellent road was built, over $1\frac{1}{2}$ miles long, from the village to the Beverly line, at a cost of about \$40,000. The work was commenced early in the spring and progressed with rapidity, the roadway being opened to travel early in July.

A roadway, 20 feet in width, was constructed, the surface being made of trap rock thoroughly rolled and grouted with a most excellent quality of an asphaltic product applied hot under pressure.

The completion of this stretch of road furnished a first-class highway from the Beverly line through Manchester to the Gloucester line. It was built in two years, entirely at the expense of the town, and the Commission feels that the town and its officials are to be congratulated on the most excellent results obtained.

In Gloucester, beyond the Manchester line, there were about $1\frac{3}{4}$ miles of old macadam State highway, 15 feet in width, that had been worn out and in poor condition for the past few years.

This year this section was widened and resurfaced, the curves being banked and made at least 21 feet in width, and the rest of the hardened surface made over 18 feet in width, with an ample shoulder on each side.

This work cost over \$28,000, because the widening required the blasting out of ledges, etc. The widening alone cost over \$7,000. The road was opened for travel in the early fall. The same type of construction was used as in Hamilton and Manchester.

The road has been widened very considerably beyond, near Freshwater Cove, where there was a very dangerous corner and a bad hill between two high ledges. The city of Gloucester co-operated in this work and paid for blasting out enough more ledge, to make room for a narrow sidewalk. Mr. J. H. Hammond contributed \$1,000 toward the cost of the widening opposite his estate. This very necessary work was extremely expensive, because the highway ran between two solid ledges from 6 to 15 feet in height.

The stone removed was used in widening the road and in building retaining walls, guard rail, etc. The cost of all this work, widening, resurfacing, etc., was about \$3,700.

Boston to Providence.

In Dedham on this route the town widened a narrow section on Ames Street beyond the end of the State highway. The Norfolk County commissioners co-operated to the extent of relocating the road, and the town of Dedham constructed a tar macadam roadway. This is a great improvement, because the old road was extremely narrow and crooked.

The highway bridge over the Charles River on the line between Dedham and Boston is to be rebuilt and widened.

On this route in Boston the city has been widening extensively, and has been building a boulevard for several years. Much of the road beyond Dedham on the route to Providence was an old road, the hardened surface being only 15 feet in width, and it also had an excessive crown. All of the old narrow road requires widening, flattening and resurfacing.

In 1915 over \$31,000 was spent on this work in the towns of Norwood, Walpole, Norfolk and Wrentham, and about 5 miles

of road were widened and resurfaced. The work has been continued this year.

Substantial improvement has been made in a bad curve in the road in Wrentham at "Wampum Corner." The Norfolk County commissioners widened the road, the street railway track was relocated, and the Commission paid for widening the State highway, banking the curve, etc.

In Wrentham the State highway was widened and resurfaced on both the north and south sides of the town, over \$12,000 being allotted for the work. It has not as yet been completed, but nearly $1\frac{1}{2}$ miles have been widened and resurfaced.

In Attleboro over one-fifth of a mile was widened and resurfaced, and in Westwood over 1 mile was widened and resurfaced, as well as a short stretch in Norfolk, about \$14,000 being spent. The work was going on when the season closed, and a quantity of material has been placed on the roadside, to be used when the season opens.

There was a bad stretch of road in Walpole between the two pieces of State highway, including a section of the village street. After several conferences with the selectmen and others interested, the Commission agreed to lay out and construct an extension of State highway, about a quarter of a mile in length, to the village square, and appropriated \$4,000 for this purpose. This road is practically completed, it being a macadam road penetrated with an asphalt product.

The Commission also agreed to share in the cost of constructing the village section, it being understood that any money left from the sum available for work on the "Hartford turnpike" was also to be used for constructing the village road. The understanding was that the town should appropriate \$6,000, and that then this balance from the Hartford turnpike should be expended, and the Commission would allot enough more money from the motor vehicle fees fund to construct a good road surface at least 18 feet in width.

The town appropriated the \$6,000, and also some money for additional work in the square. There was about \$1,875 available from the Hartford turnpike fund, and the Commission had to allot \$7,285 to pay for its share of the estimated cost of construction.

The town has taken the contract for the road through the village, and considerable progress has been made. It will be completed early in the spring.

Hartford Turnpike.

This old turnpike has been claimed to run through many towns and on a number of different roads. Undoubtedly it did go from Dedham, through a part of what is now Westwood, Walpole, Dover, Medfield, Millis, Medway and Bellingham.

For several years past the Commission has been using motor vehicle fees to help in improving this route, the county of Norfolk and the towns of Medfield, Millis, Medway and Bellingham co-operating.

A gravel road has been constructed and most of it has been coated with oil or tar.

In the towns of Medfield and Millis the whole length of road is completed, and in Medway it is practically completed, though it needs shaping and rolling in the spring. In Walpole there were only 1,950 feet. There are over 3,600 feet of this road in Dover, and it is in poor condition. The road is on the extreme edge of the town, and the Commission hopes that the town and county will co-operate in building it.

Practically the only section that remains to be constructed between Bellingham and the Westwood line is the stretch of 3,600 feet in Dover.

The town of Franklin also is co-operating in improving a road that will connect with this line.

In Bellingham the road on the main line to Providence through Woonsocket is being improved, nearly a mile being built this year.

There is already a reasonably good country road in summer through Mendon to Uxbridge, and portions of the road in Uxbridge have been improved.

Boston to Fall River via Taunton.

This route, often called the "Hartford turnpike" as far as Taunton, is the most direct route from Boston to Taunton and Fall River, and is much used by motor vehicles.

The whole route has been improved, the State having co-

operated in the construction of practically the whole length from Canton to the Taunton line, either building it as State highway or sharing the expense with the towns under the "small town" act.

Many of the older sections should be widened and resurfaced.

In Canton, from the Milton line to the State highway, the Commission helped several years ago to improve the road, using motor vehicle fees. The town wished to construct a gravel road and to coat it with asphaltic oil. The Commission felt that such a form of construction would not last under the heavy traffic, especially as part of the road required a foundation. It so advised the town, offering at the same time to construct about half of the length as a State highway, if the town would construct the other half in an equally permanent manner. The town officials believed that the cheaper form of construction would be satisfactory. As the Commission had originally promised to put in a small sum of money from the motor vehicle fees to improve the road, it felt that it should not fail to keep its word. The gravel road was constructed and oiled, but it has never remained long in good condition. It ruts easily and requires constant patching, and last winter and spring the road broke up under frost action, and for quite a distance was almost impassable, particularly where the soil was poor and a foundation should have been put in.

The Commission renewed its offer this year either to construct one-half the length as a State highway, if the town would construct the other half in an equally permanent manner, or to construct the whole length if the town would pay one-half the cost.

The town of Milton has built a piece of tar macadam road from the Canton line toward Boston.

The State highway in both Canton and Stoughton should be widened and resurfaced, but, other roads being more important, it seemed best to improve these sections by widening and repairing them from time to time until they could be substantially resurfaced or reconstructed.

Most of the road in Easton was improved a good many years ago by the town and the Commission jointly under the "small town" act. The old type of water-bound macadam, 15 feet in

width, was constructed. Much of this is in poor condition and should be widened and resurfaced.

There is a short section of tar macadam, constructed only a few years ago at the joint expense of the town and State, that is still in good condition and will remain so if properly maintained.

There is, however, a long stretch of road in Easton on the Raynham end that is extremely rough and should be reconstructed. For a large part of the way it is built over a swamp, so that its reconstruction will be expensive. The Commission has offered to share the expense of reconstructing this piece of road with the town, but the town has not as yet agreed to co-operate.

It seems only equitable that the town should bear its portion of the expense, because not only is Easton a rich town, having a valuation of over \$12,000,000 and a relatively small mileage of highways to care for, but it has an annual income from the Ames estate that is available for highway purposes, the only condition being that the town must each year appropriate for highways an amount of money equal to that income. So far as the Commission is aware, there are only two or three towns in the Commonwealth that receive any such assistance from outside sources, though, of course, very many of them receive a considerable amount of money from the franchise and excise taxes paid by the street railway corporations.

Another reason why the town ought to co-operate is because the State has already paid one-half the cost of constructing this road under the "small town" act. The attitude of some of the larger and richer towns in refusing to co-operate is incomprehensible to the Commission, in view of the fact that almost all of the poorer towns co-operate eagerly and appropriate from \$3 to \$9 on the tax rate to secure help from the State in improving their roads. Every year for the past three years the Commission has been unable, with the funds at its disposal, to match all the money that was available from such sources.

In Taunton over $1\frac{3}{4}$ miles were widened and resurfaced on this route, and in Somerset about $1\frac{1}{2}$ miles were widened and resurfaced, one bad corner being improved. Over \$30,000 was expended in these improvements.

Boston to Cape Cod via Randolph, Brockton and Middleborough.

On this main line route the Commission constructed the road in Randolph from the village to the Avon line last year, the road from Avon Square to the Brockton line having been built in 1914.

In Randolph this year the town and county each appropriated \$3,000, and the Commission allotted \$3,000, which will be used in constructing a section of the road from the State highway, on the northerly side of the town, southerly toward Brockton. Before constructing this section of road it seemed wise to have the tracks of the Bay State Street Railway Company relocated, so as to permit of the construction of a wider highway.

Many conferences were held, but no agreement could be reached in time to have any work done this year. It is expected that more money will be appropriated next year, so that a longer stretch of road can be built.

Many miles of the State highway on this route are very much worn, having been originally constructed of macadam, 15 feet in width, which has been maintained by patching and by the use of an asphaltic oil covering from time to time.

The Commission has expended over \$23,000 in resurfacing and widening over 3 miles of road on this route, about $1\frac{1}{3}$ miles being in Bridgewater, over 1 mile in Middleborough, and three-quarters of a mile in Barnstable.

Eastham.

In Eastham the State highway was constructed 15 feet in width ten or more years ago. Part of it was of macadam with a sand and asphaltic oil top, and a part of it was constructed of sand and asphaltic oil by the layer method. Over $5\frac{1}{2}$ miles of this road were widened at a cost of about \$4,500. The widening was made of sand and asphaltic oil heated and mixed.

Wellfleet-Truro.

In Wellfleet and Truro the State highway was crooked and narrow (only 12 feet of hardened surface in places). For several years the Commission has been using money from the motor

vehicle fees fund to improve such portions of the road in both towns as were not State highway. It has also widened the surface of the State highway, using sand and asphaltic oil.

As stated in last year's report the Barnstable County commissioners agreed to make the necessary layout and to pay all land damages, so that the whole road could be widened and the view improved at the curves, not only on the State highway but on the whole length of road. This they did, and the Commission laid out as State highway nearly 3 miles of road in Wellfleet and over $4\frac{1}{2}$ miles in Truro.

During 1915 over \$15,000 was expended in Wellfleet in the grading and widening of the highway, and over \$8,000 was expended in Truro. In 1915 over $5\frac{1}{2}$ miles were widened to 18 feet, the curves being banked and widened to 21 feet, and about \$31,000 was expended.

This year the Commission allotted \$5,000 to be expended in surfacing with sand and oil those portions of the road which had only been graded in Wellfleet; it also allotted \$5,000 for the same kind of work in Truro, and the work in both places is practically complete.

Also, in Truro the Commission has been co-operating with the town for several years under the "small town" act in improving other highways at joint expense. This year the town appropriated \$5,000 and the Commission allotted \$5,000, which was to be used on two roads: the first, from the Truro railroad station to Ralston Beach, about 2 miles; and the second, from the North Truro railroad station toward Highland Light, about 2 miles, — a sand and oil road being constructed on both.

The Beach Point Road in Truro, along the beach to the Provincetown line, has been kept patched and in good condition with the \$500 appropriated annually for that purpose by the Legislature.

Other Roads on the Cape.

On the road between Orleans and Chatham about $4\frac{1}{2}$ miles were widened to 18 feet, and the corners and curves were banked and widened.

Much of the road along the south side of the Cape, from Chatham to West Barnstable or Falmouth, needs resurfacing and widening.

In Harwich on this route $2\frac{1}{4}$ miles were widened with sand and oil, about \$4,000 being expended. In Dennis nearly a mile was widened to 18 feet and resurfaced with trap rock penetrated with a tar product. This route connects with the State highway on the north side of the Cape at West Barnstable.

Barnstable to Falmouth.

Beginning at a point about half way between the village of Osterville and Marston's Mills in the town of Barnstable the State highway extends through the villages of Santuit and Mashpee to the Falmouth line. There is then a mile of improved "small town" road to the village of Waquoit, and the State highway extends westerly from there to a point about midway between the villages of East Falmouth and Teaticket, the entire length of this improved road being 14 miles.

In 1916 about 2 miles of State highway was constructed in Mashpee and Barnstable, connecting the State highway above referred to with the village of Cotuit.

Bourne-Falmouth.

On the highway leading from Bourne to Falmouth the Commission this year widened and resurfaced about one-half a mile in Falmouth, making the hardened surface 18 feet in width of trap rock penetrated with a tar product. This cost about \$3,500.

It also widened and banked the curves on about $3\frac{1}{4}$ miles in Falmouth and over $3\frac{1}{2}$ miles in Bourne. This was done with mixed sand and oil, the work going on all the season and being continued as late in the fall as possible. Over \$17,000 was spent for this work.

Other Routes to the Cape.

On the route to Buzzards Bay and points on Cape Cod, the improved highway now goes along the shore at Onset Bay in Wareham. On this route the road beyond the new bridge at Onset is State highway. The road leading from Onset Junction to the new bridge is town road, having been resurfaced by the town this year.

Several years ago a petition was filed with the Plymouth County commissioners asking that the Sawyer Road in Wareham be improved, the object being to secure a shorter and straighter road between Onset and East Wareham, so that the through traffic would not be obliged to pass through the latter village, where the road is narrow and crooked, and even the local traffic is very much congested.

The Commission was consulted by the Plymouth County commissioners, and, at their request, surveyed the road, made the plans and estimates, and advertised for bids for the work. The county commissioners let a contract first for the construction of about $1\frac{3}{4}$ miles of this road, which contract was later extended to cover the construction of the balance of the road, about a mile long, to its junction with the old road, the specifications calling for a mixed sand and oil road 18 feet in width. Before the extension was made, certain private individuals contributed \$2,700, which was subscribed through Mr. R. W. Emmons, 2d.

The Commission agreed to pay one-third of the cost of construction after deducting this \$2,700, and it has allotted \$6,300 to cover its share of the expense, the understanding being that the other two-thirds would be borne by the town and county.

The Highway on the Province Lands and in Provincetown.

By chapter 195 the Legislature in 1915 directed the Commission to lay out as a State highway the road on the Province Lands and the highway extending therefrom to the railroad crossing on Conwell Street in Provincetown. No appropriation was made for this work, the Commission being directed to maintain the road "in substantially the same manner and condition in which it is now maintained."

The road on the Province Lands is 10,300 feet in length. It was built under the authority of a special act of the Legislature in 1913, but only \$5,000 was appropriated therefor; consequently, the Commission could only build a road 12 feet in width, and this was built of sand and asphaltic oil by the layer method.

From the boundary of the Province Lands to Conwell Street is 3,150 feet. The extreme width that could be obtained on

700 feet of this road is 25 feet, without making expensive land takings. Therefore, the highway was laid out only 25 feet wide for this 700 feet, the balance of the road being laid out 50 feet in width.

Five thousand dollars was allotted for the widening and improvement of the road. The town took a contract to do the work, and the road has been shaped, patched, widened and improved for its entire length. A road made of sand and asphaltic oil has been constructed by the layer method, 16 feet in width. As there is very little traffic on this road, the Commission believes that with a little patching it can be made to wear for a considerable period of time.

Boston to Middleborough via Whitman.

This secondary route from Boston to Middleborough and the Cape, through Quincy, Weymouth, Abington, Whitman, East Bridgewater and Bridgewater, has practically all been improved.

The Commission and the towns have been co-operating in this work for a number of years. The route is a little shorter than the route to Middleborough via Brockton or via the Taunton turnpike; thence across to West Bridgewater and thence to the Cape.

Some of the older portions, where the macadam surface is only 15 feet in width, are considerably worn and should be resurfaced and widened. This year over \$10,000 was spent on this work, and about $1\frac{1}{4}$ miles were resurfaced and widened, over three-quarters of a mile being in Abington, and not quite half a mile in Weymouth.

In East Bridgewater on this route there were some worn-out sections of macadam road that had been built by the town, and also a section, over a mile in length, that the Commission had helped the town to improve under the "small town" act. The Commission, after taking the matter up with the selectmen, agreed to lay out and construct two sections of State highway, over $1\frac{1}{2}$ miles in length in all, if the town would appropriate one-third of the estimated cost, or \$5,000, leaving \$10,000 to be provided by the State.

The town appropriated \$5,000 and took a contract to construct the highway. A local-stone road, 18 feet in width,

penetrated with a tar product applied under pressure, is being constructed and will be opened to travel early next year.

In Bridgewater there was a little more than $1\frac{1}{4}$ miles of worn-out road on this route from the East Bridgewater line to the square.

The Commission consulted the selectmen to see if the town would co-operate in building this road as a State highway as far as the railroad crossing.

The town was desirous of having a short section, about a quarter of a mile in length, from the railroad crossing to the square constructed. This section is on a thickly settled village street and should be constructed at a much greater width than the State highway. The Commission had never considered the construction of any road beyond the railroad crossing.

The town appropriated \$5,000, which was one-third of the estimated cost of constructing a State highway from the East Bridgewater line to the railroad crossing. The representatives of the town were very insistent that the short section of village street from the crossing to the square should be constructed, representing to the Commission that it was understood and stated at the town meeting that this section was to be constructed as a part of the work the Commission had agreed to do.

The Commission felt that it was bad policy for it to lay out and construct such a village street, especially as the town could afford to build it.

Finally it was agreed that the town could use a part of its appropriation in constructing the village street, and that any money which remained after this quarter of a mile of road had been constructed should be paid toward the cost of constructing the State highway.

A State highway was laid out, a little over 1 mile in length, and the town has taken the contract for its construction. A macadam road made of local stone is to be constructed, 18 feet in width, and penetrated with a tar product.

Most of this whole route south of Weymouth will have been constructed during the past few years by co-operation between the towns and the State. The towns of Abington, Whitman, East Bridgewater and Bridgewater have all co-operated either in paying a part of the cost of constructing the road, or in constructing portions of the road at their own expense.

Boston to Brockton via Braintree and Holbrook.

The work on this route in Braintree, which was begun last year, was continued. In 1915 the town appropriated \$5,000 and the Commission allotted \$10,000, and the county of Norfolk made the layout and paid all land damages. This stretch of road was completed. This year again the town appropriated \$5,000, and the Commission allotted \$10,000 to go with it. Surveys and plans have been made, but no work has been done.

In Holbrook the Commission offered to co-operate with the town in improving this their main highway on the same terms as in Braintree. The county commissioners have agreed to make the layout and pay all land damages, and have intimated that the county might pay a part of the expense of construction.

The town appropriated \$2,500, and the Commission allotted \$8,500 for the construction of about three-quarters of a mile of this main road, beginning at the Braintree line and extending northerly. No doubt this section will be built next year, and it is hoped that the town will continue to co-operate, so that the whole road, outside of the village street, may be constructed.

Boston to Cape Cod via Plymouth.

This route was practically completed in 1914, when the road in Bourne was built nearly to the bridge over the canal at Sagamore. This whole route has very heavy traffic, especially in motor vehicles, because it not only furnishes an alternate route to all points on Cape Cod beyond Sagamore, but also for such points it is shorter than the route via Bridgewater or Brockton, though it is not as short as the inside line to Plymouth via Hanover Four Corners and Queen Ann's Corner.

In 1915 about \$33,000 was spent in widening and resurfacing portions of some of the older State highway in Weymouth, Hingham, Cohasset, Scituate, Marshfield, Duxbury and Plymouth, though in some of these towns only the corners and curves were widened and improved.

Both last year and this the work consisted of diminishing the crown and widening the hardened surface from 15 to 18 feet,

banking the curves and widening them to 21 feet or more, and cutting away banks, etc., to improve the view. This year about 1 mile of road was widened and resurfaced in Scituate, about 1 mile in Marshfield, and over three-quarters of a mile in Hingham, about \$33,000 being spent for this work and for widening some stretches of State highway which were not resurfaced.

A contract was let for the resurfacing and widening of a portion of the State highway in Duxbury, but work has not been commenced.

In Plymouth negotiations have been in progress for several years to secure the improvement of about 1 mile of road leading southerly from the village to the old State highway. The Commission offered to construct a State highway there, the hardened surface to be, 18 feet in width, with adequate shoulders and gutters on the side, if the town would widen the street to at least 50 feet and pay all damages, and get the street railway company to relocate its tracks so that a sufficient width of roadway could be secured. The town was also to construct sidewalks where any were required.

There were many consultations before any agreement could be reached as to how and where the road should be widened. Any widening involved the cutting of trees and the encroachment on private estates on one side of the road or the other, and naturally the owner of each estate desired to have the taking made on the other side of the road. Finally, a plan was agreed upon, the town voted the necessary authority and made an appropriation to pay the damages.

A contract was let for the construction of this mile of road. Its construction involved considerable grading, the cutting down of banks, and the moving and relocation of the street railway tracks.

A macadam road 18 feet in width was constructed, which after being thoroughly rolled was grouted with an asphaltic product applied under pressure.

The Commission allotted \$20,000 for the construction of this road.

Boston to Plymouth via Hanover Four Corners.

This old turnpike route to Plymouth, via Lovell's Corner, Hanover Four Corners and Queen Ann's Corner, is nearly 7 miles shorter than the shore route to Plymouth via Scituate, Marshfield and Duxbury.

There were about $2\frac{1}{4}$ miles of road on this route in Weymouth, and the town, the county and the Commission each agreed to pay one-third of the estimated cost of construction, which was \$15,000.

After the work started the county and town requested the Commission to rebuild two culverts or small bridges which were too narrow for the traffic. This the Commission agreed to do, the town and county each agreeing to pay one-third of the cost of constructing these culverts if the total expense of all the work exceeded \$17,000. The county also made the necessary layouts and paid the land damages.

This whole section of road was laid out as a State highway, and a contract was let for its construction in 1915. About one-half of the work was done that year.

The road was completed and was opened to travel early in the year. A macadam road, 18 feet in width, made of local stone and penetrated with an asphaltic product, was built.

In Hingham nothing has been done as yet, though the Commission expects the town to join with the other towns on the route in building the road.

In Norwell the whole length of road has been improved in the past under the "small town" act, at the joint expense of the town and State.

In Hanover there are two short sections of State highway, built eight or ten years ago, one on the route to Plymouth and one on the road leading to Rockland. For many years the town has been urgently requesting the Commission to complete the remaining section on the road to Rockland. This the Commission was unwilling to do, because it felt that the main through route to Plymouth should be constructed first, at any rate, as it was of much more benefit to the public.

The Commission has offered for several years to co-operate with Hanover in building on this line, and to pay two-thirds of the cost if the town would pay the other third.


Finally, this year the town appointed a committee that decided that it would be wise to appropriate a substantial sum of money and to improve several roads. They had several conferences with the Commission, requesting it to prepare plans, estimates and specifications for the work to be done on all the roads to be improved. The town appropriated \$26,000 for the construction of these roads.

The Commission agreed that if the town expended this amount of money, and constructed, among other roads, the road from the end of the State highway to the Rockland line, about $2\frac{1}{4}$ miles, and also constructed another road connecting two sections of the town, that it would be equitable for the Commission to lay out and construct the remainder of the road on the Plymouth route, and an allotment of \$15,000 was made for the purpose. A contract was let and the work is in progress.

On the main route where the State highway is to be built, about $1\frac{3}{4}$ miles long, an estimate has been prepared for the construction of a road surface made of hot crushed gravel mixed with an asphaltic product, placed upon suitable foundation. The road surface will be 18 feet in width, and the estimated cost is \$20,000. The work will be done as soon as possible next year.

In Pembroke the whole 4 miles of road have been improved, the town and State co-operating. The balance of the road, about $2\frac{3}{4}$ miles, was laid out and constructed as a State highway, the town appropriating \$9,000 toward the cost. Over \$28,000 was expended on the work.

In Duxbury the whole road on this route has been constructed as a State highway from the Pembroke line to the Kingston line, the town having appropriated over \$16,000 to cover approximately one-third of the cost, the Commission providing the balance.

In Kingston there was about three-quarters of a mile of poor road on this route. After discussing the matter with the selectmen and with the Plymouth County commissioners, the town and the county each agreed to contribute \$2,000 toward the cost of constructing this short section. The road was laid out as a State highway from the Duxbury line to the junction of the 1905 section of State highway on the shore road in Kingston. 

A contract was let for its construction. Because of the labor conditions this year the bids received were much higher than the estimate, and the Commission had to increase its allotment. Work has been commenced and the grading is well under way.

When this section and the section in Hanover are completed, the only unimproved section on this route will be the $2\frac{1}{4}$ miles in Hingham, which is now only a fair country road.

This road is about 20 miles in length from the point where it leaves the State highway in Weymouth to the point where it joins the State highway in Kingston. More than 15 miles of this road will have been improved in four years by co-operation between the towns, counties and the State. Two more miles have been constructed by the town and State jointly, and three-quarters of a mile is old State highway.

Fall River and New Bedford to Wareham via Fairhaven, Mattapoisett and Marion.

This is a main route from Providence via Fall River and New Bedford to the Cape.

This year the Commission widened and resurfaced about 2 miles of the State highway in Dartmouth and Westport. It also shared in the expense of constructing a short section of road in Westport near the Fall River line and in improving the view at the junction of the State highway and Sanford Road.

The Commission laid out about one-half mile of State highway on this route in Fairhaven, constructed by the town in 1915, from the Alden Road to the State highway leading to Mattapoisett.

In Mattapoisett, where the traffic is heavy, and the road was badly worn, it was entirely reconstructed for about a half mile with cement concrete.

In Marion over one-half a mile of road was widened and resurfaced, as was a short stretch in Wareham. About \$27,000 in all was expended in improving these roads.

Fairhaven-Acushnet-Middleborough.

Representatives of the city of New Bedford advocate the construction of a State highway in Fairhaven leading to Acushnet, Rochester and Middleborough. After going over the several

roads leading toward Acushnet, the Commission decided to lay out as State highway a section of Adams Street from North Main Street to Huttleston Street. This section of road is over 1 mile in length. The survey has been made and plans prepared.

In Acushnet, on this route, a section of State highway was laid out many years ago. After a consultation with the Commission the selectmen agreed to pay one-fourth of the cost of constructing the road from the State highway to the Fairhaven line. The town appropriated \$5,000, and the Commission allotted \$15,000.

When this section is built there will be an improved road for practically the entire distance from New Bedford to Middleborough.

Dartmouth-Westport.

Another quite important road, locally at least, is the road in Dartmouth leading toward Westport, and connecting New Bedford with the seashore and such summer settlements as Westport Harbor and Point, Horseneck Beach, etc.

In Dartmouth the town and Commission have been co-operating in maintaining, oiling and improving the whole length of this road, nearly 5 miles in all, the town and the Commission contributing \$3,000 each year, making \$18,000 available during the last three years.

The whole length of road has been shaped, patched and oiled, and over $1\frac{1}{4}$ miles have been constructed in a more permanent way during the last two years.

During the last three years the town of Westport and the Commission have been co-operating in improving, maintaining and oiling about 8 miles of road on several different routes. Most of the work has consisted of a light surface on the old road, the surface then being oiled. All of the main line from Westport town hall to the State highway at North Westport has now been improved. During the last three years the town appropriated \$12,285 and the Commission allotted \$10,185 for this work.

Fall River to Providence via Seekonk.

This route has been completed so far as State highway construction is concerned, and $2\frac{1}{2}$ miles were widened and resurfaced in 1915. Only a short section was resurfaced in Somerset on this route this year. A great deal of the road is worn out, and should be resurfaced and widened.

Fall River to Providence via Warren, R. I.

This whole route has been improved to the Rhode Island State line at Warren, where it connects with a good macadam road. At Warren this road connects with the State highway leading to Bristol and thence to Newport.

Providence to Taunton and Middleborough.

This whole route between the Rhode Island line and Taunton has been constructed so far as the State highway is concerned. About 2 miles were widened and resurfaced last year.

A short section of State highway remains to be laid out in Taunton, to connect with the State highway already constructed on the road to Middleborough. The rest of the road to Middleborough has been already improved.

SECONDARY OR OTHER ROUTES.

Co-operation by the Towns.

The towns are appropriating more money each year to co-operate with the Commonwealth in constructing and improving their roads.

Last year the Commission allotted money for work in 225 cities and towns. This included State highways and work done under special acts as well as allotments made under the "small town" act and from the motor vehicle fees.

The towns and cities co-operated and made appropriations in nearly three-quarters of all the places in which work was done.

Appropriations were made by 161 towns and 1 city, to be used with the funds allotted by the Commission for the construction of an improved highway.

In these 162 municipalities over \$391,000 was appropriated for the improvement of these highways. In a few instances the municipalities and the counties as well appropriated money to be used in the construction of State highways or of highways that were being constructed from funds appropriated by special acts of the Legislature, but in a vast majority of the places these appropriations were used in extending the work which the Commission was doing with funds taken from the "small town" fund or from the motor vehicle fees fund.

The co-operation by the counties is fully described elsewhere in this report, but in this connection it should be stated that the counties agreed to contribute over \$123,000, to be used by the Commission in extending the work of constructing improved highways. This makes over \$515,000 that the municipalities and the counties agreed to contribute this year.

The Commission allotted this year, from the money available in the small towns and from the motor vehicle fees fund for use in the towns, nearly \$379,000, to be used with the money appropriated by the towns and counties for the construction and improvement of town roads. This made over \$894,000 in all available for the improvement of these roads.

This is certainly a remarkable showing when one realizes that prior to 1908 the Commission had only \$50,000 a year available for the improvement of "small town" roads, and that the towns themselves only appropriated a little over \$22,000 for the improvement of these roads.

In 1908 the law was passed making \$25,000 more available each year for use in towns whose valuation was under \$1,000,000, provided the towns themselves appropriated from their own funds an amount equal to the amount allotted by the Commission for the improvement of the town road. After the passage of this act the Commission had only \$75,000 a year available for use in improving town roads, and the towns only had to appropriate \$50,000 a year to meet allotments made by the Commission.

It was not until 1910 that the Commission was authorized to use any part of the motor vehicle fees for the construction or improvement of town roads. The Legislature that year authorized the Commission to spend in the towns 20 per cent. of the

net motor vehicle fees in constructing or improving the through routes or the roads leading from one municipality to another.

It was not until 1913 that the Legislature made available \$1,000,000 a year in place of the \$500,000 a year that had been available for the construction of State highways and "small town" roads.

Of this amount, the \$100,000 a year that the Commission is authorized to expend on "small town" roads is only available in towns that appropriate an amount equal to that allotted by the Commission. Consequently, the towns are only obliged to appropriate this \$100,000 a year to secure the funds which the Commission has available for use on town roads.

In 1909, only seven years ago, the towns were appropriating less than \$50,000 a year to co-operate with the State in improving town roads. The Commission had only \$75,000 which it could expend on such roads, making in all \$125,000 a year available. The counties were not co-operating in this work at all.

In 1916, only seven years later, 162 municipalities appropriated over \$391,000, the counties appropriated over \$123,000, and the Commission had available and allotted nearly \$379,000, making over \$894,000 available for the improvement of these town roads. Seven times as much money was available in 1916 as was available in 1909. The towns and counties together in 1916 appropriated over four times as much money as the State and the towns combined had available in 1909.

Surely this is a remarkable showing and one for which the towns and counties deserve the greatest possible credit.

Co-operation by the County Commissioners.

The county commissioners are co-operating with the Commission more and more every year in helping to construct secondary routes.

The Commission has been using the motor vehicle fees fund for this purpose, because the counties are not required to repay any part of the expenditures made from this fund, while they have to repay one-quarter of all the money expended from the State highway construction fund or the "small town" fund; and it is possible to build many secondary routes by such co-

operation, the counties, towns and State each contributing one-third.

This year the Commission had over \$250,000 available for such work, and two of the larger counties, Middlesex and Essex, were ready to contribute a larger amount of money than the Commission felt that it could allot to these counties in fairness to the others. Middlesex County offered to bear one-third of the cost of such work up to \$100,000. It may be wise for the Commission in the future to expend a larger proportion of these fees in those counties where the county will pay one-third of the cost, rather than in counties where they do not care to do so.

In connection with this work it should be remembered that in the four western counties, including Worcester County, where the Legislature in 1914 made available \$2,000,000 for constructing 17 routes, approximately 163 miles of road, they were required not only to make the necessary layouts and pay all the land damages, but also to repay to the treasury 25 per cent. of any money expended. They also, under the general law, have to repay one-quarter of all the money expended by the State in the construction of State highways or "small town" roads. For the next three years, at least, these counties cannot well afford to pay any more toward the improvement of highways.

There is a great difference in what the other counties are doing. Bristol and Plymouth counties could well afford to help some of their poorer towns improve their highways, especially on the main roads that are being used and worn out by the motor vehicles, from the larger cities and towns, which travel over them.

Hampshire County put \$300 into 1 town, the town appropriating \$1,000 and the Commission allotting \$1,500. About three-fifths of a mile of road was constructed.

Berkshire County is paying \$2,000 toward the cost of constructing a concrete bridge, and the town is paying an equal amount.

Plymouth County put \$2,000 into 1 town, the town appropriating \$3,000 and the Commission allotting \$4,400, to improve about $1\frac{3}{4}$ miles of road. The county is also paying \$2,000 toward the cost of building a State highway in another town.

The county is constructing a road in another town and will ultimately pay one-third of the cost or about \$6,300, the Commission and the town each paying a like amount.

Franklin County put \$2,500 into 1 town, the town appropriating \$5,660 and the Commission allotting \$2,500, to improve about $1\frac{1}{2}$ miles of road.

Bristol County put \$1,500 into 1 town, the town appropriating \$1,500 and the Commission allotting \$3,000, for the improvement of $1\frac{3}{4}$ miles of road.

Worcester County put \$11,000 into 9 towns, the towns appropriating \$16,300 and the Commission allotting \$22,650, to improve about $5\frac{1}{2}$ miles of road.

Norfolk County put \$11,905 into 8 towns, the towns appropriating \$18,390 and the Commission allotting \$19,190, to improve nearly 6 miles of road. The excess in the appropriations in this county by the Commission and the towns is because in one of the towns (Walpole) the Commission and the town are together constructing a section of road on the main line to Providence on which the county is paying very little. In all the other towns the county is paying one-third of the cost of the improvement.

Essex County put \$21,500 into 9 towns, the towns appropriating \$21,500 and the Commission allotting \$21,500, for the improvement of about $5\frac{1}{2}$ miles of road.

Middlesex County put \$51,150 into 24 towns, or 25 different roads, the towns appropriating \$66,650 and the Commission allotting \$51,550 for the improvement of about 18 miles of road. The county is also paying one-third of the cost, or \$6,000, toward building a State highway in one city, the city paying \$6,000 for the purpose, and the Commission paying the remainder. In this instance, also, the larger appropriation by the towns is because in one town (Concord) \$20,000 was appropriated for the construction of one of the main roads, and the county and State are paying a much smaller proportion of the cost. In all the other instances the State, county and town are each paying one-third of the cost.

All of this money has not necessarily been expended, but the counties and towns have agreed to make these expenditures when and as the work is done.

In all, these 8 counties have agreed to spend over \$123,000 in 55 towns, the towns themselves having appropriated \$134,000, for the improvement of about 36½ miles of road, the Commission having allotted \$132,590 from the motor vehicle fees for this purpose.

The owners of motor vehicles who pay this \$132,000 in fees have secured the improvement of these 36 miles of road, and have secured from the counties and towns nearly \$257,000.

The towns, for the \$134,000 they appropriated, have secured about \$255,000 from the counties and from the motor vehicle fees, to be expended in improving their town roads.

Surely this is a good thing for all concerned. Every one, and the traveling public especially, has secured a great benefit. Three times as much money has been secured, and three times as many miles of road have been improved, as would have been possible without such co-operation.

The Commission hopes that the time will soon come when all the counties will co-operate to the fullest extent, and that they will appropriate enough money to match all the motor vehicle fees that are available for this purpose, — something over \$250,000 a year, — so that all the fees can be used on roads where the counties, towns and State each pay one-third of the cost of improvement.

By co-operation alone can the roads be improved rapidly. The Commission feels absolutely certain that the towns will eagerly avail themselves of such an opportunity.

AID TO TOWNS FROM "SMALL TOWN" AND MOTOR VEHICLE FEES FUNDS.

Since the passage of the so-called "small town" act, the Commission has allotted from that fund about \$1,140,920 for the improvement of town ways, and the towns in which the work has been done have appropriated about \$831,800, making about \$1,972,720 that has been spent in the improvement of about 518 miles of road in 195 towns.

The Commission in 1916 allotted about \$123,973 under the provisions of the "small town" act, and improved about 36 miles of road in 85 towns, the towns contributing about \$116,425. In several instances in the richer towns the town

appropriated and spent much more money than that allotted by the Commission.

There is included in the amounts credited to the towns, in many cases, money appropriated by the counties to aid the town in improving the road, and in a few instances individuals interested in particular roads have also contributed.

In the opinion of the Commission, the work that is done in the "small towns," including the advice given to the municipal authorities, is the most valuable work that the Commission and its engineers are doing.

When work is done under the "small town" act, it is almost invariably done by the local authorities themselves, and in the manner set forth in contracts and specifications prepared and furnished by the Commission. The materials must be suitable and used as directed. In all cases the necessary drainage is taken care of.

The work is done under the supervision of one of the Commission's engineers. The local authorities who have charge of the roads are being educated in the building of these roads, including the selection of suitable materials, the method of spreading and rolling, and providing for drainage, foundations, etc., where necessary.

The road itself, when properly built, educates the whole community, as well as all the people who use it, not only as to the benefits secured from the use of a good road, but, also, as time goes on, as to the economy of building a road in a proper manner, with adequate drainage, foundation, etc.

The real difficulty comes in convincing the people that constant maintenance is absolutely necessary for the preservation of a good road. Every year the municipal authorities are realizing more and more the necessity for maintenance, and the number of cities and towns using some form of bitumen, not only to lay the dust, but to preserve the road as well, is increasing.

The Commission is doing all in its power to convince all road authorities that constant maintenance is not only absolutely necessary, but will save a vast amount of money.

MOTOR VEHICLE FEES AVAILABLE FOR THROUGH ROUTES.

The Commission allotted \$254,959 from the motor vehicle fees fund for use on the through routes in 120 towns this year, and the towns and counties contributed about \$331,105, making a total of \$586,064 available. This money was used in constructing, improving and maintaining many miles of road on routes that are much used by automobiles.

In many towns the Commission furnished the oil or tar that was spread upon the road, the town, at its expense, patching and preparing the surface, spreading the bitumen and covering it. By this work many miles of road were preserved that would otherwise have raveled and disintegrated under the motor traffic. The roads were also made dustless, affording much comfort to the traveling public, and, what is still more important, preventing the dust from becoming an intolerable nuisance to the abutting residents.

The Commission feels sure that in the benefit derived from the many miles of dustless State highways and town roads, and in the tire costs and other repair expenses which are saved because of the many miles of improved road, the owners and users of motor vehicles receive each year a value far in excess of the fees paid by them. These benefits would not be possible if the motor vehicle fees were not available for this work.

ENGINEERING ADVICE TO MUNICIPAL AUTHORITIES.

The requests for engineering advice are more numerous every year, and in all cases the Commission sends an engineer to look over the ground. In some cases the Commission furnishes plans and specifications for the work, advertises the contract, and arranges for the supervision of the work, the municipality paying the estimates as they become due.

Almost invariably the advice of the Commission and its engineers is followed by the local authorities, resulting in better and more permanent construction of highways and bridges.

The Commission furnished engineering advice to 43 cities and towns this year, and these municipalities expended over \$291,000 of their own money for the improvement of highways and bridges.

APPROVAL OF SPECIFICATIONS.

By chapter 719 of the Acts of 1913, as amended in 1914, it is necessary that specifications for the construction of municipal ways be approved by the Commission before the town or city can borrow money on long terms for the work. Under this act 9 cities and 9 towns presented specifications for approval in 1916. In each case a study was made of the conditions, as to materials, traffic, etc., and in some instances it was necessary to redraft the specifications to insure construction suitable for the needs.

Thus the Commission during the year gave engineering advice or approved specifications for the construction of roads in 61 cities and towns.

CONVICT LABOR, PRINCETON HIGHWAY.

The Worcester County commissioners and the Wachusett Mountain Commission some years ago established a camp on Wachusett Reservation, and by an arrangement with the sheriff obtained about 40 convicts, who were used in building the road to the top of Wachusett Mountain and various other roads within the reservation, and in the cultivation of about 15 acres of land.

A small stone-crushing plant was purchased, also a roller, and the various tools that were necessary. The sheriff provided the necessary guards, fed the men, and \$1 a day was paid to the county for each laborer. So far as can be ascertained the county came out about even on the transaction, neither making nor losing much money, because it cost more to feed, guard and transport the men there than it did in the jail.

The road work was under the charge and supervision of Everett W. Needham, the superintendent of the Wachusett Mountain State Reservation. The road to the top of the mountain was widened, the grades very materially improved, and a local-stone macadam road was built. The stone was rolled with a horse roller. It was a most creditable piece of work, and an excellent road was constructed. Quite a few other roads were constructed within the reservation. A camp was constructed for the men at a cost of about \$2,500.

TOWN ROAD BUILT BY CONVICT LABOR.

In 1915 the Worcester County commissioners suggested to the town of Princeton and to this Commission that it would be desirable to improve the highway leading from Princeton village to the foot of the mountain. This road was narrow, had several bad grades, and in many places the natural soil was bad, so that the road was almost impassable in the spring. It was suggested that convicts be used to do this work, and that they could occupy the camp that had been built on the reservation.

The State allotted \$2,500, the county of Worcester \$1,500, and the town of Princeton \$1,000. The road was built 20 feet wide, with an average width of 14 feet, of local crushed stone 8 inches thick in the center and 6 inches on the sides. On top of this was a covering of hardpan and dust. In building the road a foundation was necessary for part of the distance, and over 1,000 cubic yards of stone filling was used; there were about 460 cubic yards of excavation, about 500 yards of borrow, and over 3,200 tons of crushed stone.

The culverts cost about \$100; teams cost \$4.50 a day; two foremen, \$2.50 a day each; and the county received \$1 a day for each laborer. There were about 40 convicts at the camp; an average number of 26 were used on the road, 14 being necessary at the camp for farm, camp and commissary purposes. Seven thousand five hundred feet of macadam road were built in five months by this gang at a cost of \$5,175.79.

The crushed stone was only rolled with a horse roller. If a steam roller had been used, it would have increased the cost about \$250. There was, of course, no charge included for overhead charges, interest on plant, depreciation, etc.

The experiment, however, was certainly a success, because the men were given out-of-door work, which not only improved their health, but undoubtedly was a great benefit to them morally as well.

From the foregoing it will be seen that one gang of 30 to 40 convicts, which is about as many as can be used to advantage on a job of this character, can only build about $2\frac{1}{2}$ to 3 miles of road a year, because they can only work five to six months in

most places. The amount that can be accomplished with convict labor in road building is limited. They can only be used in a suitable locality where they can be properly located, guarded, etc., and this must be near the work or the cost of transportation would be excessive.

This work was continued this year. The town of Princeton appropriated \$1,500, the county of Worcester \$2,000, and the Commission allotted \$3,500.

The work was done under the supervision of Mr. E. W. Needham, superintendent of the Mt. Wachusett Reservation, who served without pay. There were two foremen on the work, one at the crusher and getting out field stone, and the other looking after the grading and the placing of the stone. The foremen were paid at the rate of \$2.50 a day, and \$4.50 a day was paid for the necessary double teams.

The length constructed was 5,800 feet, 15 feet in width of local crushed stone, with suitable shoulders on each side. The area was 9,667 square yards completed on the hardened surface alone, and the approximate cost of the road surface, including excavation, foundation, gutters, shoulders and drainage was 67 cents per square yard.

The following shows the estimated quantities and approximate unit cost of each item of work done: —

Excavation, 1,700 cubic yards, at 31 cents,	. . . . .	\$527 00
Borrow, 650 cubic yards, at 42 cents,	. . . . .	273 00
Stone fill, 3,035 cubic yards, at 86 cents,	. . . . .	2,610 10
Broken stone, 2,900 tons, at 96 cents,	. . . . .	2,784 00
Repairing culverts,	. . . . .	249 99
		<hr/>
		\$6,444 09

This year much more excavation was necessary than on the 1915 section, and much more of the road required a stone foundation; therefore the length constructed was less. In 1915 there was about 460 cubic yards of excavation, while in 1916 there was 1,700 cubic yards. The stone filling necessary in 1916 was 3,035 cubic yards, as compared with 1,000 cubic yards in 1915.

The work was planned by the engineers of the Commission,

and was under the general direction of one of its assistant division engineers. He states that the work has been handled in a very economical manner and full value has been obtained with the amount expended.

This most interesting work has been carried on under the most favorable conditions, a camp having been already provided within the reservation and very near to the work.

The experiment has certainly been a success, even more so this year when other labor has been scarce and wages high. The cost has been considerably lower than the average cost of similar construction elsewhere in the State. The Commission thinks it probable, that with the men costing only \$1 a day each, there was a saving in cost of from 20 to 30 per cent. and perhaps even more this year. It hopes that the work will be continued in the future, and that similar arrangements can be made in other places to use prison labor in constructing improved highways.

The number of prisoners who could be used, however, is quite limited for many reasons, but it is probable that another suitable gang could be secured in Worcester County, and one or two such gangs could be provided in at least seven of the other counties.

RESURFACING AND WIDENING.

The Legislature in 1916 appropriated \$315,000 for the ordinary maintenance, oiling and patching of State highways. Of this amount, the cities and towns had paid into the treasury about \$125,000. It also made an additional appropriation of \$100,000 for widening and resurfacing. Hence the Commission had available for maintenance, widening and resurfacing \$415,000, appropriated by the Legislature (of which amount \$106,000 will be paid back to the State by the counties), and over \$1,000,000 obtained from the motor vehicle fees and fines, making about \$1,415,000 in all.

It should be remembered that, while the Legislature actually appropriated the above, there is no such sum of money actually levied and collected as a part of the State tax; first, because the counties are required by law to repay into the State treasury one-fourth of all the money expended from annual appro-

priations for the maintenance of State highways (not including any expenditures from the motor vehicle fees fund).

Second, the cities and towns are required by law to repay each year to the State treasury a certain portion of the total amount that is expended for the maintenance of the State highways within their limits. This amount never exceeds one-half of the total expenditures for such maintenance, and the amount to be collected per mile of road varies according to the valuation of the town, — from \$50 a mile a year in towns of under \$1,000,000 valuation to \$2,000 a mile in the aggregate and not exceeding \$500 a mile a year in towns and cities whose valuation exceeds \$5,000,000.

The net amount which the Commonwealth itself has to pay and collect in State tax is a very small proportion of the total necessary expenditures, and is only about one-third of the amount appropriated annually by the Legislature.

The first and most necessary thing to be done was to keep in as good condition as possible the existing State highways, over 1,100 miles in length. This was done by constant patching and the use of bituminous covering. The drainage also had to be kept open. On practically all State highways there were either section men or repair gangs in charge of the maintenance to keep the roads at all times in proper repair.

Bituminous materials were used during the year on practically all the State highways that had not been constructed of concrete or paved, unless recently resurfaced with bituminous materials.

Only a few years ago the authorities in charge of roads were not in agreement as to the necessity of using some bitumen, on the top surface at least, to preserve the roads. To-day there is so much motor traffic on all roads that even in remote villages oil or tar is being used on the road surfaces.

The Commission used this year over 3,800,000 gallons of various tar and asphalt products, either in construction or for surface treatments and patching. Much of this bitumen was used in the construction and maintenance of town roads.

During the year over $51\frac{1}{2}$ miles of State highway were resurfaced, $23\frac{1}{2}$ miles were widened but not resurfaced, and 40 miles were widened and resurfaced.

The total cost of this work of widening and resurfacing was over \$657,000, the widening costing over \$156,000.

The resurfacing alone cost over \$500,000, or an average of nearly \$10,000 per mile. This large expenditure was necessary, not only because of the high cost of labor and materials this year, but also because many of the roads had to be entirely reconstructed and a foundation put in as well. In several places a cement concrete road was built to replace the old macadam, practically a new road except for the existing grading and drainage.

More and more roads will have to be made stronger, as well as wider, at great expense, if something is not done very soon by the Legislature to limit the weights that can be transported over our ordinary highways, especially in the country districts.

Ordinary Maintenance.

Ordinary maintenance includes the cost of the patching done by the section men in charge of the roads. This ordinary maintenance cost over \$322,000, or about \$280 a mile for the 1,155 miles of State highway. Of course, some of the newer roads required very little maintenance. The maintenance alone cost over \$145,000, or about \$125 a mile, and the patching alone cost over \$177,000, or about \$155 a mile.

Probably the first item would fairly represent the average maintenance cost on all the roads, but the cost of patching would be much above the average cost if it were figured only on the roads that really required substantial patching.

A much fairer estimate would distribute the \$177,000 spent in patching alone over 700 to 800 miles of the older highways that really had to be patched, which would make the cost of patching from \$220 to \$250 a mile.

Surface Treatments with Light Oils or Tars.

More than 600 miles of the older State highways were coated with light oils or cold tars. This work cost over \$164,500, or an average of about \$274 a mile. Most of these roads had been coated in former years, so that only a very small quantity of the bituminous material was spread on each square yard,

usually from one-fifth to one-quarter of a gallon. Consequently, only a small quantity of sand or gravel covering was required. On a few miles of road a larger quantity had to be used, and the expense was greater in consequence. On a few miles, where the traffic was extremely heavy, a second application was made during the season.

Taking the 700 to 800 miles of the older State highways of water-bound macadam, or gravel, or sand and oil, that were maintained by patching and by the use of some bituminous coat on the surface, the total cost of maintenance was from \$620 to \$650 a mile.

The total amount spent by the Commission for resurfacing, widening and the above maintenance was over \$1,140,000.

Excessive Costs postponed Much Work.

Much more money would have been spent but for the scarcity and high cost of labor. The cost of all work this year was much greater than last year; perhaps 25 to 35 per cent. is the normal increase, and the Commission has not hesitated to let contracts or do work at such an increase in the cost. It well knew that wages alone had advanced from \$1.85 and \$2 a day, for 8 hours of labor, to \$2.40, \$2.50, \$2.60 and even \$3.

If any work was to be done, this increase in the cost must be recognized and allowed for. When, however, the bids were from 75 to 100 per cent. higher than last year's prices, the Commission has felt that it could not in fairness to the Commonwealth do the work at all. In such cases it has rejected all bids and either left the road unbuilt or has maintained the road in the best condition possible. This applies to both construction and resurfacing.

Work was seriously interfered with not only by the labor conditions but by embargoes on freight, delay in securing materials, and the uncertainty of the arrival of materials. There was much irregularity in deliveries, all of which delayed and added to the cost of the work.

The engineers in charge of this work deserve credit for the amount of work that was accomplished, and for the way in which it was done, as well as for the small increase in the expense, considering all the conditions this year.

Some of the contractors also deserve great credit for the way in which they prosecuted their work, often at a considerable loss, under the unfavorable conditions existing this year.

More Roads should be widened and resurfaced.

During the last five years the Commission has only had money enough available to resurface 251 miles of the older State highways. When this resurfacing was done, 124 miles of road were widened to 18 feet, and 127 miles were resurfaced but could not be widened. During the last two years 41 miles of the old State highways were widened but were not resurfaced, making 165 miles in all that have been widened.

For many years the Commission has reported to the Legislature that all the older highways on the main routes should be widened as well as resurfaced; that they were worn out; that when originally built the hardened surface was only from 12 to 15 feet in width except for a few miles; that the traffic had increased two and one-half times in six years, — in 1915 the average number of vehicles passing over the State highways in a day was over 600, whereas in 1909 it was less than 250. On any main line 2,000 or more motor vehicles are not at all unusual on any pleasant Saturday, Sunday or holiday.

The roads should be made wider and stronger, and the corners and curves improved in the near future. All of this costs money and more and more money each year.

This past year the Commission did not spend all the money which it had available, because of the scarcity and high cost of labor; but this surplus will be expended next year.

It should be remembered, however, that in 1906 more than 670 miles of State highway had been constructed, and that until five years ago practically none of them had been either resurfaced or widened. To-day these 670 miles of State highway are from ten to twenty-two years old. Some of them have been resurfaced or widened.

Only 251 miles have been resurfaced during the last five years, many of them carrying heavy traffic and being roads constructed after 1906, near the cities. Consequently, there are a great many miles on these older roads that will have to be strengthened and improved in the near future.

WORK DONE UNDER SPECIAL ACTS.

Sengekontacket Bridge between Edgartown and Oak Bluffs.

The Legislature in 1915, by chapter 173, required this bridge to be rebuilt by the above towns, and directed that the work be done to the satisfaction of this Commission. The character of the work, etc., is fully set forth in our last year's report on page 79, etc. The bridge has been constructed and the necessary approaches completed.

The placing of this bridge in a new location to improve its alinement required certain changes to be made in the State highway, and new approaches also had to be built. These changes have been made, and the bridge and road have been open to travel all this summer.

The bridge alone cost about \$5,300 for the pile structure, the bulkhead and filling which took the place of a portion of the old bridge cost about \$3,300, and the approaches and road about \$4,300, making a total of about \$12,800 for the whole improvement.

Each town appropriated and paid \$4,000, and the Commission allotted the balance of the money from the motor vehicle fees fund.

Ashburnham.

By chapter 214 the Legislature in 1916 authorized the Commission to expend \$10,000 in the construction or improvement of a highway in the towns of Ashburnham and Ashby, known as the Ringe Road. The work was to begin at the end of the section improved under the provisions of chapter 229 of the General Acts of 1915, by which \$10,000 was appropriated, and to extend southeasterly to or toward the State highway in Ashby.

With the money available in 1915 a gravel road 15 feet in width and 8,950 feet in length was constructed and opened for travel in the fall. It was coated with light oil this spring.

Plans and specifications were prepared to continue the work with the money appropriated in 1916, and a contract was let for the construction of about $1\frac{1}{4}$ miles. This work is practically completed.

Highway from Cotuit Village in Barnstable, through Mashpee to the Road to Falmouth.

The Legislature in 1915, by chapter 242, appropriated \$14,000 for the construction of this highway.

When the actual surveys and estimates had been made over two routes, they showed the probable cost of the southerly route to be \$36,000, and the probable cost of the northerly route to be about \$27,000, being in part over an existing highway.

As the Commission stated last year, it had intimated that if the necessary land and rights of way, drainage, etc., for the northerly route were secured without expense to the Commonwealth, it would construct a road on that route, making some of the funds at its disposal available for the purpose.

The plans were sent to the town of Mashpee, which voted to assume all land and grade damages, etc.

The road was laid out and the Commission allotted \$14,000, from the fund available for the construction of State highways, to go with the \$14,000 appropriated by the Legislature.

Late in May a contract was made for the construction of the road, and work was begun promptly. In common with all other work this year, labor conditions were very unfavorable, and the progress made has been rather slow.

A new pile bridge was built over the Santuit River at a cost of about \$1,900. Most of the necessary pipes and culverts have been put in, and the subgrade is nearly prepared for the top surface of sand and oil, which will be put on as early next year as possible, — work of this character cannot be done in cold weather. Altogether something under \$9,000 has been expended up to the present time.

New Braintree.

By chapter 212 the Legislature in 1916 appropriated \$10,000 to be expended by the Commission, in addition to the \$10,000 appropriated by chapter 257 of the General Acts of 1915, in the construction or improvement of the highway from North Brookfield to Barre Plains.

In 1915 surveys were made and plans and specifications were prepared for the construction of a section of this road in New Braintree. A contract was let for the work late in the year. There was no good gravel obtainable, so that a local-stone, water-bound macadam road 15 feet in width, with a 3-foot shoulder, was constructed.

The soil conditions are extremely bad in this locality, and it was necessary to put in a foundation for practically the whole length of the road. About 1 mile of road was constructed with the money made available in 1915.

When the additional \$10,000 was made available, further plans, etc., were made, and an arrangement entered into with the contractor to extend the work a distance of about 1 mile, which work will be completed in the spring or early summer.

The town of North Brookfield appropriated \$2,000, the Commission allotted \$2,000 and the county of Worcester contributed \$1,000 for the construction of a section of road upon this route in North Brookfield from the New Braintree line southerly. The town has taken a contract to build about 2,700 feet of water-bound macadam road, and this work is practically completed. The road is to be covered with a thin bituminous coating in the spring.

Hopkinton.

By chapter 219 the Legislature in 1916 appropriated \$5,000 in addition to any sums heretofore appropriated, to be expended by the Commission in the construction or improvement of the highway leading from the Milford line through Hopkinton to the Cordaville railroad bridge in the town of Southborough.

The Legislature appropriated \$10,000 for use on this road in 1914, and \$5,000 more in 1915, making, with the \$5,000 appropriated in 1916, \$20,000 in all.

There is considerable traffic between Milford and Hopkinton, whereas beyond Hopkinton the road going towards Cordaville is of less importance.

The work was started at the Milford line, and all the money available has been spent in building towards the town of Hopkinton. The work has been done by local labor and teams employed under the direction of the engineers of the Com-

mission, and excellent results have been obtained for the money expended.

A water-bound macadam road, 18 feet in width, has been constructed, with a foundation of gravel or stone where it was necessary, and about $1\frac{3}{4}$ miles have been built in all, leaving about 1 mile more that will have to be constructed before the village of Hopkinton is reached.

The road that was constructed in 1914 and 1915 was coated with a thin bituminous covering this year.

Norton-Taunton.

The Legislature in 1915, by chapter 230, appropriated \$12,000 to be expended in the construction of a highway from the town of Norton toward the city of Taunton over whatever route the Commission deemed best.

As was stated in last year's report, there was considerable doubt as to which route was the better. If the road following the car track were selected, a relocation for a part of the way through the "neck of the woods" was desirable; also, the old road had to be widened and the car tracks moved in many places in order to secure a road of suitable width with adequate shoulders.

A survey was made and the plan was submitted to the town. The majority of the people seemed to prefer to have the car line route followed.

In March the town voted to accept the new layout on the plan made by the Commission, to have the necessary takings made, and to indemnify and hold harmless the Commonwealth against all land and grade damages. The Commission thereupon decided to build upon this route, the city officials of Taunton also favoring it.

The Commission informed the Legislature last year that on account of the character of the road, the poor soil conditions, etc., it was extremely doubtful if even 1 mile of road with a relatively permanent surface could be built for the \$12,000 that was available, and that it was 3 miles from Norton village to the Taunton line.

The Legislature in 1916, by chapter 204, appropriated \$8,000 more, making \$20,000, and the Commission allotted \$15,000 from the State highway construction fund.

After fully considering all the conditions, the Commission decided to construct a cement concrete road 18 feet in width, with suitable shoulders on each side. While the first cost of such a road is considerable, the Commission believed it would prove economical in the end. Where the road was relocated for about 2,100 feet, and considerable filling was necessary, the Commission decided not to lay the concrete surface until next season, in order to let the road settle.

The concrete road was constructed from the square in Norton to the cut-off, about 1,600 feet in length, and 7,100 feet were constructed beyond toward Taunton, making 8,700 feet in all. This is now substantially completed. When the remaining 2,100 feet are constructed in the spring, a little over 2 miles will have been completed.

Revere.

By chapter 230 the Legislature in 1916 authorized the Commission to expend not exceeding \$200,000 in purchasing or taking land for the purpose of laying out and constructing a highway in the city of Revere from a point on Revere Street at or near its junction with the State highway to a point at or near Winthrop Avenue or to a point between Winthrop Avenue and Charles Eliot Circle, either wholly or in part over a new location or along existing highways as the Commission might determine.

The Commission was authorized to use for the construction of a highway on said location any of the money that, in its opinion, was not necessary to pay for land damages. It was authorized to secure a location not exceeding 80 feet in width, provided that where existing highways were followed the layout might be of the same width as the existing streets.

Hearings were held and a number of conferences had with the officials of the city of Revere and numerous interested parties. Every one agreed that it was of the utmost importance that the section between Revere Street and Beach Street should be constructed as soon as possible, so as to accommodate the heavy summer traffic, especially while the Revere Beach Park Boulevard was closed to automobile traffic.

South of Beach Street there were already existing highways which could be used as soon as this missing link was con-

structed. Several plans were presented and various routes advocated. The commissioners and engineers inspected and carefully studied the proposed routes, and it was finally decided that the best route to follow was that extending from Revere Street to Beach Street in part upon Waban Street, widened to 80 feet, and in part upon a new location 80 feet in width, to a point on Beach Street opposite Otis Street; thence along Otis Street to Waverly Avenue, and along Waverly Avenue to Winthrop Avenue near its junction with the Revere Beach Parkway. At this latter point the traffic can turn in either direction, going over Winthrop Avenue to the State highway, and thence to East Boston, or in the opposite direction it can follow Winthrop Avenue to Revere or the parkway to points beyond.

A State highway about 3,800 feet in length was laid out from Revere Street to Beach Street, the width of the layout being 80 feet. For a part of this distance the layout followed Waban Street, which had been laid out 40 feet in width but was never really constructed. This street was widened to 80 feet, involving the moving of several small buildings of little value. For the remainder of the distance the location was over vacant land.

The contract for this work was made early in November, and the work has been commenced. It is hoped that much if not all of the grading, culvert work, etc., can be completed before spring, so that the surface can be put on in the spring and early summer.

On this section the slopes will cover the whole width of the location, and the roadway will be graded 34 feet in width on the top, the traveled portion of the way being 32 feet in width. This hardened surface is to be of broken stone grouted with a bituminous material.

Otis Street and Waverly Avenue are 50 feet in width, with sidewalks with a granite curb on each side. No contract or specifications have been prepared as yet for this section of the highway, but it is proposed to construct the road the full width from curb to curb.

In order to secure a good safe curve with an unobstructed view, where the highway crosses Centennial Avenue and goes

into Waverly Avenue, it was necessary to remove four buildings.

The question of the settlements for the land and buildings taken was referred to the Attorney-General, who authorized the employment of Ernest A. Thompson to examine the titles to the land and negotiate the settlements. Most of the claims for land damages have been settled and deeds secured, and the amount of damage on only two or three comparatively small pieces of land remains to be agreed upon. It seems probable that about \$75,000 will be sufficient to pay all claims for damages for the land taken and the buildings that had to be torn down or removed.

The length of road under contract, from Revere Street to Beach Street, is about 3,800 feet; and the distance that is not under contract, from Otis Street and Waverly Avenue to Winthrop Avenue, is a little over 3,000 feet. The completion of the section from Revere Street to Winthrop Avenue will provide a new traffic route from Lynn and points north to East Boston, a project which has been strongly advocated for many years by individuals and the communities that would be accommodated, and recommended by practically every special commission and committee appointed to consider improvements in the metropolitan district.

The city of Boston constructed Bennington Street in East Boston, connecting with a State highway at the Revere line, spending \$1,000,000 on the improvement, according to a former mayor of the city.

In 1899 this Commission, under direction of the Legislature, made plans for the building of about a mile of road in Lynn along the water front, to connect Sea Street in Lynn with the Revere Beach Parkway at Saugus River. A special appropriation of \$100,000 was made for the construction of this piece of State highway, and it was practically completed in 1905.

In the meantime appropriations had been made, and the Metropolitan Park Commission had been authorized to build the boulevard in the vicinity of the Point of Pines and construct the bridge over Saugus River.

As no through heavy traffic was allowed over the parkway, there was a constant demand for the construction of a traffic

road. Finally, in 1910, the Legislature appropriated \$125,000, and directed this Commission to make plans and secure the necessary land and rights of way.

In 1912, \$175,000 additional was made available. The highway was to start at or near the Point of Pines station and continue to Revere Street, a distance of about 11,000 feet.

The Commission was authorized to select the route, and after making numerous surveys, plans and estimates, and having innumerable hearings and interviews, it decided to construct the road where it now is. In 1913 the Legislature authorized a layout 80 feet in width instead of 60 feet. The layout was made, and the road was completed and opened to travel in the fall of 1914.

In 1915 the Legislature directed the Metropolitan Park Commission and this Commission, sitting jointly, to study the whole situation and make a report with recommendations as to what had best be done to provide for the traffic.

An elaborate report was made with plans and estimates for various improvements, and this was submitted to the Legislature. This special commission stated that something should be done, either by the construction of a widened and improved traffic highway between the beach and the railroad, or by continuing the State highway beyond Revere Street to Winthrop Avenue. Estimates were presented for all the various improvements, and the Legislature in 1916 passed an act appropriating the \$200,000 necessary for the continuation of the traffic road from Revere Street to Winthrop Avenue. When this is completed there will be a road that can be used by heavy traffic all the way from Lynn to East Boston.

To make the route safer and more useful, however, the grade crossing on Winthrop Avenue should be abolished and the short section of that avenue which connects the end of the new traffic road with the existing State highway in Revere should be constructed. This will complete an improvement that has been agitated for more than twenty years.

Discontinuance of State Highway in Norwood and Westwood.

By chapter 77 the Legislature in 1916 authorized this Commission to discontinue as a State highway that part of Washington Street in the towns of Norwood and Westwood between

the points at which said street intersects a new way laid out and constructed by the Norfolk County commissioners in 1912.

This act was passed at the suggestion of the Norwood town officials and was favored by the county commissioners, because the new way had been constructed of greater width on the west side of the railroad tracks and eliminated two overhead railroad crossings.

The Commission was asked to lay out and maintain this new road as a State highway, but it was unwilling to do so unless it could discontinue the State highway on the east side of the railroad between these two crossings, both roads being parallel and not far apart.

The section of State highway in question was discontinued May 10, 1916, and on the same day the new way was laid out as a State highway, 382 feet being in Westwood and 4,288 feet in Norwood.

The surface of the road being in good condition, the Commission thought that with some patching and a surface coat of bitumen covered with peastone and sand, from time to time as required, it could be maintained in good condition for some time. Eventually, as the traffic increases, the road will have to be reconstructed.

Hingham.

By chapter 213 the Legislature in 1916 authorized this Commission to construct and maintain a highway in the town of Hingham from the easterly end of the State highway on Lincoln Street in Hingham to the boundary lines of Cohasset and Hull at West's Corner.

This highway was to be constructed on the basis of a 60-foot location, over such route as the Commission might determine either by the use or widening of existing ways, or in whole or in part upon a new location. The cost and expense was to be borne by the Commonwealth in the first instance, and the treasurer was authorized to borrow \$200,000, to be expended under the direction of this Commission. Upon the completion of the highway the cost of construction, land damages and interest were to be apportioned as follows: $37\frac{1}{2}$ per cent. on the Commonwealth, 25 per cent. on the county of Plymouth, and $37\frac{1}{2}$ per cent. on the town of Hingham, it being understood that the Commonwealth's share would be paid by the

Commission out of its regular funds available for the construction of State highways.

Chapter 91 of the Resolves of the Legislature of 1915 required this Commission to report to the Legislature in 1916 as to the possibility and desirability of constructing such a highway in the town of Hingham. A fairly comprehensive report was made (House, No. 367), stating the various possible routes and, roughly, the approximate cost of each.

After careful studies the Commission has practically determined that the best route from the end of the existing State highway on Lincoln Street is that starting at the corner of Thatcher Street and following a new route over private land to Otis Street, and thence by Otis Street and Harbor Street to the present main road, about one-quarter of a mile easterly from the square and railroad station. Surveys and plans have been made for this section of the route, and the Commission expects to be able to advertise for bids for the work early in the spring.

This plan requires the taking of private land, not only on the proposed new location, but for widening and improving the existing highway, and involves the removal or destruction of quite a number of buildings of but little value.

Mr. George L. Barnes was designated by the Attorney-General to take charge of the examination of titles, etc., and he has been actively engaged in trying to settle the many questions involved, not only on this section of the route, but farther along on the main road (Summer Street) where the street must be extensively widened if Summer Street is followed. This will require the moving back of walls and hedges, and the cutting of a good many fine large trees on private estates of considerable value, as well as the moving back of two small dwelling houses. Considerable opposition has developed to this widening on the part of the owners whose property is to be taken. Feeling that they should have a fair opportunity to express their views, the Commission held a public hearing, which was quite largely attended by the interested parties.

They all realized that something was needed to improve conditions, and that an adequate highway of sufficient width must be secured, but they very seriously objected to having

the route follow Summer Street, because that involved more or less injury to their private estates as well as the cutting of a large number of very fine old trees. Some also objected to having such a highway, with the traffic to the reservation and beaches, go by their houses.

Practically all of them urged the construction of a new highway crossing the main road, where the first-mentioned section came out, continuing on a new location down toward the railroad tracks, then continuing along with the railroad for a considerable distance, and then curving back and joining the existing highway beyond Old Colony Hill.

They argued that if such a new route were selected and a modern highway constructed over it, all the traffic would follow the improved road, and that then Summer Street could be left in its present condition and would be adequate for all the traffic that would then use it.

While the Commission has felt that Summer Street must be widened at some time, and that the present time seemed a seasonable opportunity, it also feels that no unnecessary damage should be done to any of these interested landowners.

It has therefore had surveys made for the laying out of such a route, and is having estimates prepared to ascertain the relative cost of the several routes which might be constructed in order that it may determine which, on the whole, is the most desirable.

It has also instructed Mr. Barnes to ascertain as nearly as possible what the damages will be, not only for the takings and widenings on Summer Street, but also what will be the cost of the land which would be required if the proposed route along the railroad were followed.

Plymouth-Bourne.

By chapter 205 the Legislature in 1916 authorized the Commission to spend the sum of \$10,000 in the construction or improvement of a highway between "a point near the stores of Costello and Swift in the town of Plymouth and a point near the house of George Starbuck in Bournedale village in the town of Bourne."

The act required that before the work was begun the sum of \$5,000, to be equally divided between the counties of Barnstable and Plymouth, should be paid into the treasury of the Commonwealth. The other \$5,000 was to be paid by the Commonwealth. The county of Barnstable paid its \$2,500 into the treasury the latter part of July, and the county of Plymouth deposited its \$2,500 the middle of August.

A contract has been let for the construction of about $1\frac{1}{2}$ miles of the road, the grading being practically completed. Next spring a surface of sand or gravel, mixed with asphaltic oil, will be placed upon the subgrade, 18 feet in width, with suitable shoulders. This portion of the road will be completed early in the summer.

About 3 miles of road must be built to connect the two points mentioned in the act, one of them being on the State highway leading from Plymouth to Sagamore, and the other on the State highway along the north side of the Cape Cod Canal, leading from Buzzards Bay to Sandwich and so on down the north shore of Cape Cod.

Each of the two counties being required by the act to pay an equal amount of money into the treasury, the Commission thought it equitable to begin the construction at the Plymouth-Bourne line and build in both directions an equal length in each town. To complete this road about three-quarters of a mile will have to be constructed in the town of Plymouth and about half a mile in the town of Bourne.

Sandwich-Mashpee.

By chapter 216 the Legislature in 1916 authorized the Commission to spend \$10,000 in constructing or improving the highway between the town hall in Sandwich and the center of Mashpee village over what is deemed by the Commission to be the best route. There are several different roads which might be constructed in the town of Mashpee, and there is a great difference of opinion as to which route should be followed. The Commission and its engineers have been over the several possible routes, and there are advantages and disadvantages in all.

For traffic going to Falmouth it would be a little shorter

if the road on the west side of the pond and through Forestdale were built, where there are a few houses.

The road on the east side of the pond accommodates quite a number of summer cottages, and also goes by the grounds where the artillery regiments have a camp. It connects with the State highway a little way east of Mashpee village, so that while it is slightly longer for traffic going to the village or to Falmouth, the road is constructed all the way and this route would be shorter for traffic going to Cotuit or beyond to other points on the Cape.

Surveys have been made of some of the roads, but no actual construction has been begun. The whole distance to be built is about $7\frac{1}{2}$ miles, so that with the money available only a small portion could be built even if a sand and oil road were constructed.

Dracut-Methuen.

The Legislature in 1916, by chapter 203, directed this Commission to construct and improve the highway known as the Black North Route, from Lowell to Lawrence, in the towns of Dracut and Methuen, beginning at the junction of Broadway and Arlington Street in the town of Dracut, and extending easterly to the Methuen line, and thence along Broadway and North Lowell Street in the town of Methuen; and authorized the expenditure of a sum not exceeding \$10,000 for the purpose. The act reads to "further construct and improve the State highway."

In 1906, 1907 and 1908 the Highway Commission constructed 9,650 feet of State highway upon this route. Prior to the construction of any highway upon this route the Commission made a careful study of the possible and most desirable routes between Lowell and Lawrence, and recommended the construction of a road along the river. Such a route was not only shorter and very beautiful, but it could have a better alinement and much better grades. It required, however, the laying out of a highway upon a new location not only in the county of Middlesex but also in the county of Essex. As this new location could not then be secured, the Commission constructed this short stretch of State highway on the Black North Route.

After this short section of highway was constructed, the county commissioners of Essex and Middlesex, the cities of Lowell and Lawrence and the towns of Dracut and Methuen took up anew the project of building the boulevard along the river.

This resulted in the passage of several special acts requiring the counties to lay out and construct certain portions of the road; and after they had been laid out and constructed this Commission was directed to take over these portions as State highways, and over \$100,000 was appropriated for the construction of the surface in 1911 and 1912.

Subsequently, by special act, a section of new road on this route was to be laid out and constructed by the county commissioners in Essex County, in the city of Lawrence and town of Methuen, and \$60,000 was made available for the purpose. This Commission laid out this new section of road after it had been constructed and graded with gravel, and constructed a bituminous macadam surface on it.

The Commission has constructed a section of State highway on the old road in Methuen, which connects these two sections of river boulevard, and it expects to complete a State highway on this route next year, a contract having been let for the work.

It has also made plans and had a number of conferences with the Middlesex County commissioners and the mayor and city government of Lowell in relation to the laying out and construction of a new road on a new location along the river, leading from the constructed boulevard directly into the city of Lowell. The construction of this new section will complete the river road between Lowell and Lawrence, with a most excellent road all the way.

It is practically agreed that the county of Middlesex and the city of Lowell will pay all the land damages and for all the grading, sidewalks, etc., and that when this is done the Highway Commission will construct and pay for the road surface out of its regular funds, the road being laid out as a State highway.

This most expensive but excellent road having been built connecting Lowell and Lawrence, by co-operation between the most interested parties, it seemed to the Commission that it

ought not to lay out or construct any more State highway on the so-called Black North Route. It was at most merely an alternate route of only very moderate importance even locally.

The Legislature last year, however, having appropriated \$10,000 to be spent upon this route, the Commission made the necessary plans for constructing as long a stretch of road as it could with the money available. While the act uses the term "State highway," it designated certain roads in Dracut and Methuen, about $5\frac{1}{2}$ miles in length, of which only 9,650 feet was State highway. The Commission therefore decided to commence at the end of the State highway and construct the road from there toward Methuen and Lawrence.

On account of labor conditions this year, as the town did not desire to take the contract and build the road, the Commission decided to do the work under a force account, employing its own foreman and laborers. The work was commenced in September and will be completed in the spring. A water-bound macadam road is being constructed, which will be given a bituminous coat when it is completed.

About 1 mile of road can be built with the money available, leaving between $2\frac{1}{2}$ and 3 miles to be constructed if the whole route in the towns of Dracut and Methuen is to be improved.

For the reasons above stated the Commission does not believe that its regular State highway funds should be diverted from the many uncompleted main through routes where it is now being expended to a secondary route of this character. If this route is to be constructed, the money should be secured in some other way. Possibly the counties of Middlesex and Essex would be willing to assist the towns in completing this road, as they have already assisted in so many other places. The Commission could allot a reasonable amount of money from its other funds to share the expense of construction with the counties and towns.

Lunenburg.

By chapter 215 the Legislature in 1916 appropriated \$5,000 to be expended by the Commission in the improvement of a highway in the town of Lunenburg between Shirley and Leominster. A contract was made for the construction of a

water-bound macadam road. About 4,000 feet of road have been constructed with the money available, beginning at the Leominster line and extending easterly.

Phillipston-Templeton.

By chapter 217 the Legislature in 1916 authorized the Commission to spend \$10,000 in the improvement of a highway in the towns of Phillipston and Templeton, beginning at the line between Royalston and Phillipston and extending through the northeasterly part of the town of Phillipston and the northwesterly part of the town of Templeton to or toward the State highway in the village of Baldwinsville.

On account of the labor conditions this year the towns did not desire to take the contract, and so the Commission deemed it advisable to hire the laborers and teams necessary for the construction of the road. The work was begun and has progressed very favorably for this year, and about 2 miles of gravel road will be completed in the spring with the money available.

Hubbardston-Rutland.

By chapter 210 the Legislature authorized the Commission to expend \$10,000 in the improvement of a highway between Gardner and Rutland, beginning at a point south of Hubbardston village, and extending in a southeasterly direction to or toward the State highway in the town of Rutland.

A considerable length of road on this route has been improved in Hubbardston north of the village on the road to Gardner, the Commission and the town co-operating.

This year the county of Worcester agreed to contribute \$1,200, the town of Hubbardston appropriated \$1,200, and the Commission allotted \$3,550 to continue the work on this road.

The town of Gardner is also co-operating, the Commission and the town each having agreed to expend \$4,000 on this same route in the town of Gardner.

On the road south of Hubbardston village, for which the special appropriation of \$10,000 was made, the town did not desire to take the contract, and the Commission decided to do the work on a force account, hiring the local labor and teams as far as possible. The work has been commenced and has

proceeded as rapidly as possible with the labor that could be secured. A gravel road is being constructed 18 feet in width, and the engineers estimate that about 2 miles of road can be built and that it will be completed in the spring.

It is about 8 miles from Hubbardston village to the State highway in Rutland.

Southbridge-River Road.

Under the provisions of chapter 202 the Legislature in 1916 authorized the Commission to expend \$15,000 in improving the River Road in Southbridge from the Dudley line to the village of Saundersdale.

The act provided that before any work was begun the town of Southbridge should pay \$5,000 into the treasury of the Commonwealth, the other \$10,000 being paid by the Commonwealth.

The town voted the necessary money and paid it into the treasury after the middle of August.

A contract has been let for the construction of over a mile of bituminous macadam road 18 feet in width. The work has been commenced and will be completed early next year. There will still be nearly three-quarters of a mile that will have to be built before the village of Saundersdale is reached.

Pelham.

By chapter 206 the Legislature in 1916 authorized the Commission to spend \$10,000 in constructing or improving a highway in the town of Pelham, the road being the main road from Pelham Hill, so called, to Amherst, beginning near the town hall and extending westerly toward Amherst.

The distance from the town hall to the Amherst line is approximately 4 miles, over 2 miles of which has been somewhat improved in the past years under the "small town" act. While this portion of the road is a reasonably fair country road, it will undoubtedly need improving in the future.

Pelham has a valuation of under \$500,000. It is situated on the top of a long steep hill, on which not only the grade but the soil conditions and drainage are very bad, and in consequence the construction of a satisfactory road is expensive.

In addition to the \$10,000 especially appropriated by the Legislature, the town appropriated \$750 and the Commission allotted \$2,100 for use on this road, making \$12,850 available for the work. A contract was made for the work in October, and the work has been begun. The surface is to be of local-stone macadam, 15 feet in width, which will be given a coating of asphaltic oil when it is completed. The engineers estimate that about 6,800 feet of this road can be constructed with the available money.

Resolve in Favor of Virgil C. Pond of Brookline and Annie W. Pond Crocker of Foxborough.

By chapter 29 of the Resolves the Legislature in 1916 appropriated such a sum, not to exceed \$280, as this Commission might determine to be equitable compensation for damages by fire to the property of Virgil C. Pond and Annie W. Pond Crocker in that part of Walpole called South Walpole, which fire was caused on or about May 20, 1913, by sparks from a steam roller owned by the Commonwealth.

This resolve was passed because the damages could not be collected by regular process under the existing laws.

The Commission had the whole matter carefully investigated, and determined that the sum of \$225 was equitable compensation, and this amount was paid.

Five Western Counties.

The Legislature of 1915 authorized the Commission to construct during the next four years certain specified highways in the five western counties. It made \$2,000,000 available for this purpose. One-fourth of the money expended in any county was to be repaid to the State by the county, and the Commission was further authorized to use the money so repaid by the counties before Nov. 30, 1921, either in completing the specified highways or in improving a main through highway, or a highway to a railway station or connecting with an adjoining city or town, in any town in those counties when the town was not located on one of the specified routes, provided the valuation of the town did not exceed \$1,000,000.

The county commissioners were directed to furnish the necessary rights of way in their respective counties, and to lay out such location as this Commission should approve or suggest.

There were seventeen routes specified, located in thirty-eight towns and one city. Only portions of these routes have as yet been surveyed, so that even the length of the highways to be constructed cannot be determined; but scaling the routes on the map shows that there are approximately 163 miles to be constructed. Besides this, there are a number of miles of road on these routes that have been somewhat improved in the past under the "small town" act or with motor vehicle fees, where the road has been merely graded and drained, but the top surface could only be made of the best local material available, which often was not very good.

As many of these roads have been built for a number of years, it is evident that the surfaces will have to be constructed of better materials, because when the route is completed the traffic will increase in volume, and a surface which was adequate for the small number of local teams will not last at all when the road is used by several hundred motor vehicles a day.

On most of these routes the subsoil and drainage conditions are bad, and foundations and drainage systems will have to be put in at a very considerable expense. In the hill towns, especially, many of the grades are extremely bad, and extensive grading and in some cases relocations will be necessary to secure a reasonably good grade. On most of the roads the location is too narrow and crooked, and extensive widening must be made.

In many towns no suitable gravel can be obtained, consequently broken stone will have to be used; and in a few of the towns it is difficult, if not impossible, to secure a good quality of local stone, the stone being too soft or brittle. Consequently, the highways to be built on these routes will be comparatively expensive to construct because of the local conditions. It is these very conditions that make it advisable to construct an improved highway, because the present highways leading to these towns are practically impassable when the frost is coming out of the ground, and are so steep, rough and dangerous at all

times of the year that no one uses them except from absolute necessity.

It is evident, if all these highways are to be built in a substantial manner, that it will be necessary for the towns which can afford it to co-operate with the Commission by appropriating money to be used with the money made available by the Legislature, as many of them have been doing for several years past.

Some of the towns perhaps cannot afford to do much, but all can do something and many of them can afford to do a good deal, thus insuring speedy construction and enabling the Commission not only to secure a better highway but also to assist some of the poorer towns to secure a reasonably good highway on their most important road.

Following is a statement of what has been accomplished on different routes: —

No. 1. — From Great Barrington south through Sheffield to the Connecticut line, about 9 miles; about 4 miles to be built under this act.

A contract was let late in the fall of 1915 for the construction of about 1 mile of highway in Great Barrington and nearly 3 miles in Sheffield. This would complete an improved highway to the village street in Sheffield.

Conditions on this route were very bad indeed. The old highway was so low that it was flooded practically every spring for several days. As the floods only occur during the occasional freshets, it did not seem that the Commission was warranted in going to the expense of grading the whole road up high enough to be always out of water. It did, however, arrange to have the lower portions of the road brought up to the average level of the rest of the road, so that during the few days of flood the water would be of even depth the whole length of the flooded portions of the road.

It was decided to build a cement concrete road 18 feet in width on this line. The subsoil is extremely bad all along this section of road; when the frost is coming out it is impassable, and even in wet weather it softens up so much that it is nearly impossible to travel much over it. This makes the work costly. It also makes a gravel subgrade necessary, and this increases the expense.

In order to expedite the work and secure a good gravel, the Commission purchased the right to take it from certain land alongside the road where there was a good quality, because this gravel seemed to be the only suitable material that could be secured at any reasonable expense.

Progress on this highway has been slow and unsatisfactory, not only because of the bad weather in the spring and the bad natural conditions, but because the contractor has not been able or has not secured enough laborers to push the work either expeditiously or economically.

The contract was let in the fall of 1915, at extremely low prices. At that time laborers could be secured for \$1.85 to \$2 a day. In 1916 conditions entirely changed, laborers were scarce and prices were much higher. In most places no laborers could be hired at less than \$2.40 for an eight-hour day, and often \$2.50, \$2.80 or \$3 a day had to be paid, and even at that in many places a sufficient number of laborers could not be secured and retained. Naturally the contractors who had large contracts at low prices, based on the former cost of labor, were certain to lose money.

Considerable work has been done on the subgrade, and the gravel base has been put in for a fair proportion of the whole length. The 18-foot concrete road has been constructed for about $1\frac{2}{3}$ miles out of the whole length of 4 miles. The expenditures this year were \$28,795.33.

If this work is not resumed early in the spring and much better progress made, the Commission will be obliged to make other arrangements for completing it.

Beyond Sheffield village there are about 2 miles of State highway, and on the remainder of the route a good gravel road has been constructed at the expense of the town and State, which can be kept in good condition for several years by the use of oil and constant maintenance.

No. 2. — From Pittsfield to Northampton through the towns of Hinsdale, Cummington and Goshen.

The improved road has been constructed from Williamsburg through Goshen to the Cummington line. Sections have also been improved in Cummington during the last few years, and a macadam highway has been built up the hill from East Windsor to Windsor village.

In Cummington the work has been going on all the year under a local foreman, who employed local labor and teams, the Commission's engineers supervising and directing the work. On many of these routes in the western counties the Commission has found it better to do the work in this way, not only because good results have been secured and good value for the money expended, but because it educates the townspeople in work of this kind.

The soil conditions all through this section of the State are bad, the ground is wet, and a stone base has to be put in most if not all the way. A great deal of blasting is necessary in order to secure a suitable width for the highway. There is no local stone of good quality nor in many of the places is there any good gravel obtainable, all of which makes construction expensive.

In Cummington the Commission has continued to build a gravel road, using the best gravel that can be obtained and placing it on a stone base wherever necessary. The road has been built 15 feet in width, the gravel being spread 7 inches in thickness, and 3-foot shoulders have been constructed.

Because of the large amount of necessary excavation and blasting, only about 1 mile of road was constructed this season. There still remain about 10 miles of unimproved road in Cummington, Windsor and Hinsdale that will have to be constructed before this route is completed.

Surveys and plans have been made so that, if conditions warrant it in the spring, a contract can be made for the construction of the road from the State highway in Windsor down the hill through a corner of Hinsdale to the Dalton line, where it will join a highway in that town, the present road between these points being narrow, crooked and dangerous. Following a brook, as it does, a good part of the way, it has a high bank on one side, often a ledge, and the construction there would be extremely expensive, involving much grading and expensive retaining walls.

There are several possibilities of relocating the road, and the Commission has had different lines surveyed to ascertain which is the best route. Estimates of costs are being prepared.

It now seems certain that a much better grade can be se-

cured by constructing the road on a location starting at the top of the hill on an existing road, which will be improved, and continuing down on a location that is a considerable distance north of the present highway. The construction on this new line will not only provide a much better grade, but a highway of adequate width can be constructed and maintained for considerably less money than would be required if the present road were followed. It will connect with an existing highway in the town of Dalton. In the meantime the old road can be used during the construction of the new one. The sum of \$18,871.32 was expended during the past year.

In Cummington the existing road, though somewhat narrow in places, is a fair country road and can be used during the summer season with comparative comfort, so that it will probably be wise to continue to construct the road, using the local labor and teams, especially as the man in charge thoroughly understands the work and secures very good results for the money expended.

Every year the Commission is trying to educate more and more local men to do good road work. Their knowledge and experience is a great asset for their own and neighboring towns. Only by the development of interest in the roads and knowledge of their construction and maintenance can any good highways be secured in our smaller towns on the local roads. Each year sees great improvement in this respect.

No. 3. — From the village of New Boston in Sandisfield up the Farmington valley through Otis and West Becket to the Jacob's Ladder State highway, about $13\frac{1}{2}$ miles.

The highway from New Boston from the Connecticut line northerly has already been constructed under the "small town" act. In Otis about 3 miles of road have already been improved under the same act. This work has been going on for eleven years. A very careful survey and study of all the possible routes were necessary before any work could be done. These surveys have now been completed, so that estimates can be prepared this winter.

No. 4. — From Bonnyrigg Four Corners in Becket through Washington to the existing State highway in Hinsdale, about 15 miles.

The first 5 miles of this road lie in Becket and were completed this spring, water-bound macadam being used. This work was done in part by the Commission and the town at joint expense, in part with a special appropriation made by the Legislature in 1914, and in part under chapter 221, General Acts of 1915, the Commission having allotted \$30,000 under the latter act.

Some 2 miles of road have already been improved in Hinsdale by the town and the Commission jointly. No doubt at some time a better surface will be needed on this section of the route.

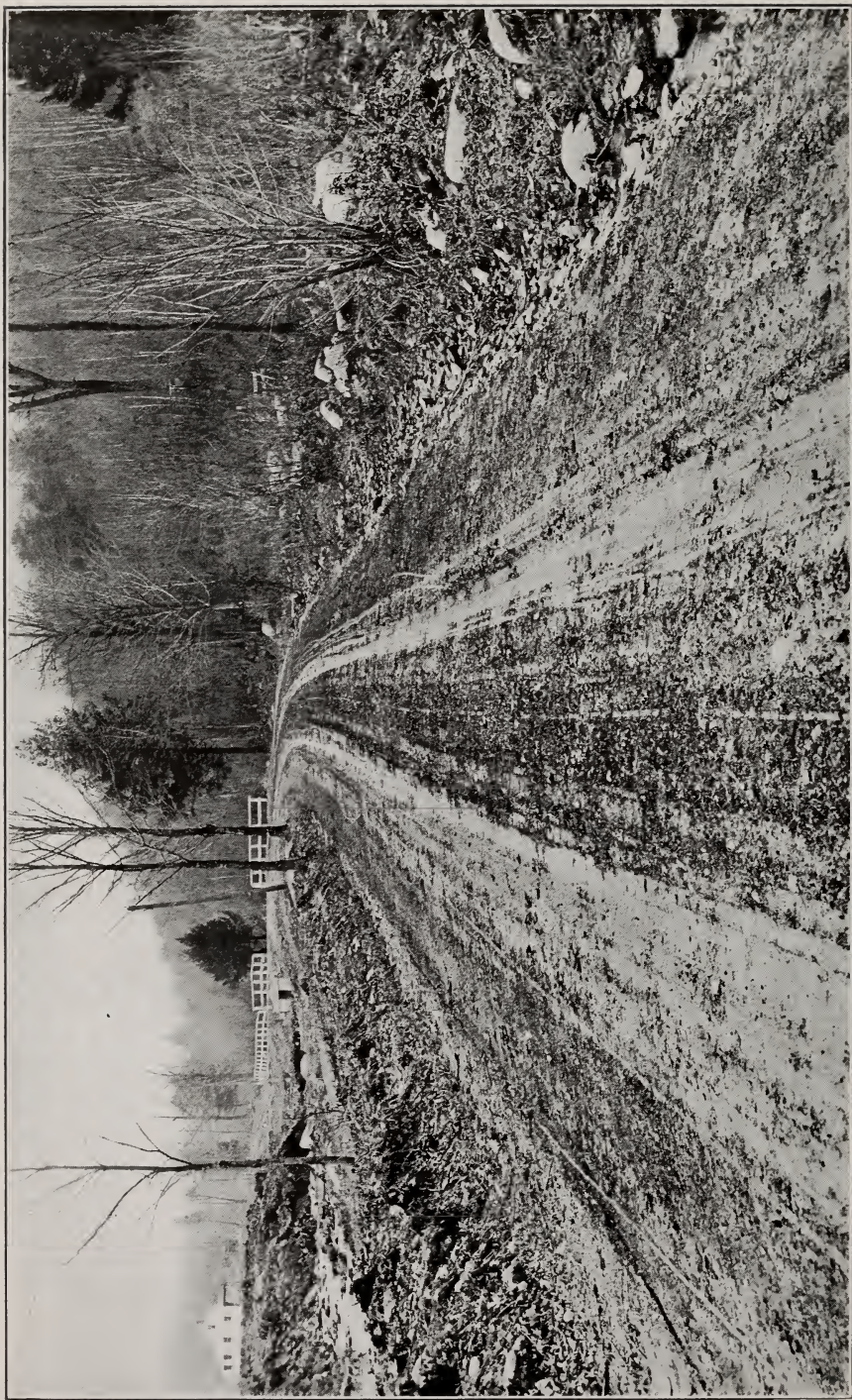
As was stated in last year's report, the work was stopped at the Washington line because it seemed probable that a much better location could be obtained. When the survey was made, it became evident that by relocating the highway a location with better grades could be secured, and two railroad crossings avoided.

A plan was made and sent to the Berkshire County commissioners, who were requested to make the layout. They held several hearings, which involved considerable delay.

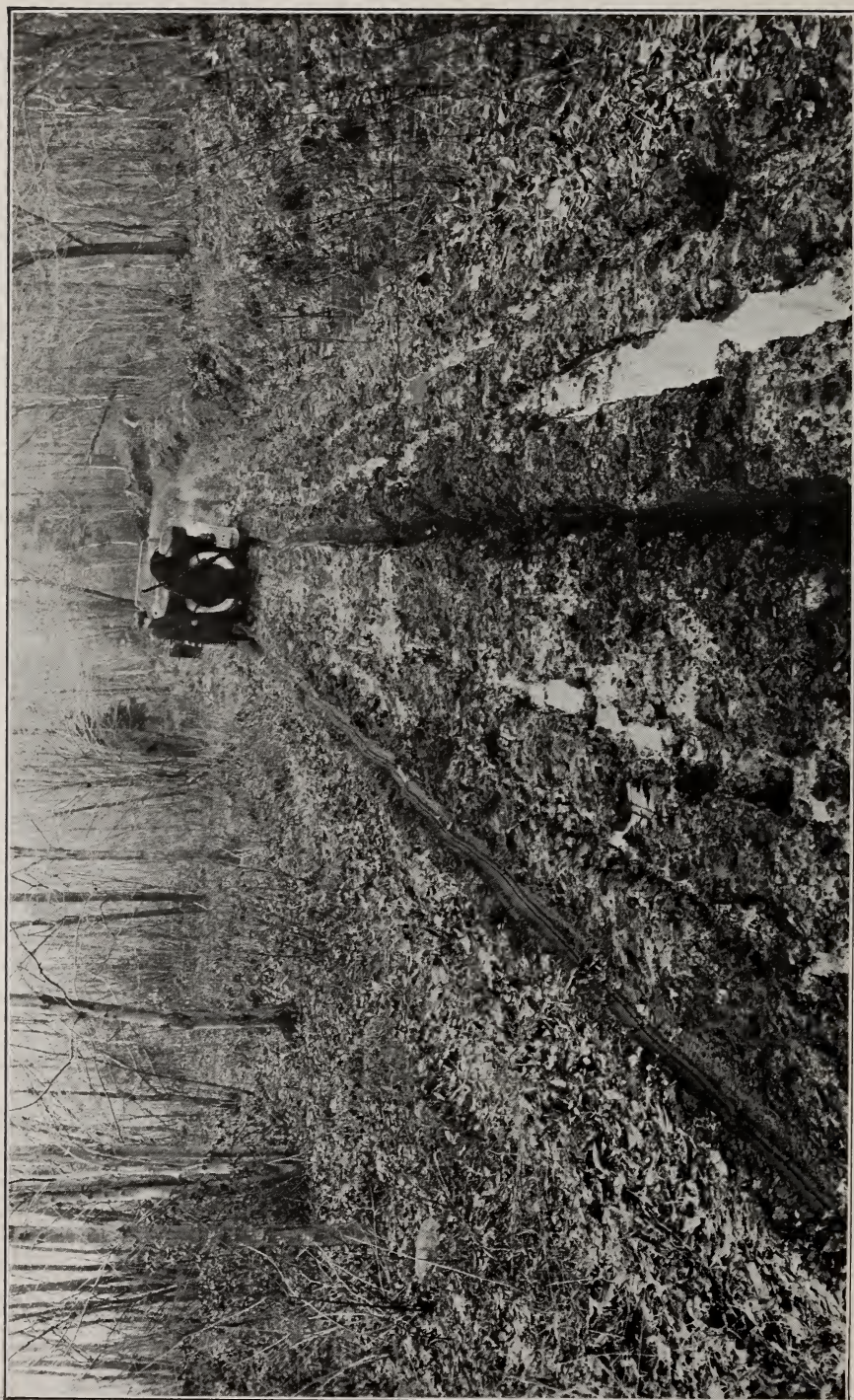
The Commission advertised and let a contract for the work before the layout was actually made, because it had understood that it would be made. The contractor went to Washington and began his work, but the road not having been laid out by the county, the work had to be stopped and the forces transferred to another place. Finally the layout was made and work resumed late in the year, so late that very little was accomplished. Work will be continued as early as possible in the spring.

There was objection, at first at least, to the new route on the part of a few of the landowners and people in the town, and this caused the county commissioners to delay making the layout. Had this delay not occurred, the road would have been well under way, and would certainly have been completed and open to travel early in 1917. Now it will hardly be ready for travel until very late in the fall of 1917 or early in the spring of 1918.

The new location and contract cover about 2 miles of water-bound macadam road, made of local stone put upon a foundation where it is necessary. The road will be coated with bitumen.



An Improved "Western County" Road in Russell.



"Western County" Road in Russell before Improvement.

The sum of \$10,371.24 was expended for the construction of this route in 1916.

No. 5. — From the main highway in Huntington northerly through Worthington to Cummington, to connect with the main highway from Dalton to Northampton (see No. 2), about 20 miles in all.

Considerable work has been done in former years under the "small town" act and with motor vehicle fees in both Worthington and Huntington, the road being widened, graded, grades improved, and the best material obtainable being used for the surface.

Unusually good progress for this year has been made on this road, an average of 100 men being employed all through the season.

Work was done in two places, two gangs being used, — one from the Worthington line south toward Huntington, and the other working from Worthington hill south toward South Worthington. In Huntington about $1\frac{1}{3}$ miles have been constructed, and over half a mile more has been pretty well completed. In Worthington a little less than a mile has been completed, and about half a mile more is very nearly done.

The expenditures this year were \$64,491.31 in Worthington and Huntington.

In both places a gravel road is being constructed. The work will undoubtedly be continued on these two sections of the route.

No. 6. — From Hinsdale easterly through Peru to Worthington, to connect with the road or Route No. 5, about 11 miles.

About 2 miles of this road in Peru have already been improved from Peru village to the Hinsdale line. This was done by the Commission and the town with the help of private individuals.

Considerable work has also been done in Hinsdale on the road to Peru. In 1915 Hinsdale appropriated \$2,000, and the Commission allotted a like amount; later in the year it allotted \$5,000 more from the western county fund, to continue the work. This work has been done on a force account, local labor and teams being used. The work has been continued this year, about three-quarters of a mile having been under construction. All of this road required a stone foundation. A

portion of it will have a gravel surface, but on the part where the traffic will be heaviest a trap-rock surface, 4 inches in thickness on a gravel base, is to be used.

A contract has been let for the construction of a viaduct near the Peru line. Between Peru and Worthington there are three possible routes, and all of them have bad grades, bad soil conditions, and are extremely wet. Studies have been made of all three routes.

The construction of any road in this locality will be extremely expensive, and even then it will probably be impossible to avoid steep grades, because the road does not seem to be of enough importance to warrant the extra expenditure of the very large sum of money which it would cost to reduce the grade to the standard of our main routes.

The Commission feels, also, that it should consider all the routes mentioned in the bill and build them all if there is money enough, and certainly it should improve as many of them as possible, not spending all the money in constructing only a few in an expensive way.

The amount expended on this route in 1916 was \$16,603.92.

No. 7. — From Plainfield to Cummington, about $4\frac{1}{2}$ miles.

No work has been done on this route because the surveys have not yet been made. With the vast amount of work on hand, especially in the western part of the State, it was impossible to complete the surveys on all of the lines contemplated.

No. 8. — From Belchertown through Enfield and Ware to Palmer via the State highway, about 17 miles.

The road between Ware and Palmer was under contract in 1915, and considerable work was done on it that year. A local-stone macadam road was constructed, which was coated with light oil. The work was continued this year.

About three-quarters of a mile of road has been built in Ware, and over $3\frac{1}{2}$ miles in Palmer.

A survey has been made in Ware to the Enfield line, and the town has agreed to pay \$5,000 toward the cost of constructing the road leading toward the center of the village. The Commission hopes to be able to construct this section of the road next year. There are about $3\frac{1}{2}$ miles of road in Ware on this line.

In Enfield the whole road from the Ware line to the Belchertown line has been improved in past years by the town and the Commission jointly, under the provisions of the "small town" act.

In Belchertown the survey has been made and a contract let for the improvement of the road from where it was improved in 1915. The work has been started, but only a short stretch of road has been done. There are about $2\frac{3}{4}$ miles of road to be built in Belchertown to the Enfield line.

While this route ends in Belchertown, there is already a State highway leading from Belchertown through Granby to South Hadley.

On the road between Belchertown and Amherst the Commission is co-operating with both towns. In Amherst the town and the Commission each put in \$2,000, making \$4,000 in all to be spent on the road to Belchertown. In Belchertown the town appropriated \$2,000 and the Commission allotted \$4,000 from the motor vehicle fees. About three-quarters of a mile of gravel road was constructed on the road to Amherst. A short piece of the road on this line runs through a corner of Pelham.

The sum of \$34,334.55 was expended on this route in 1916.

No. 9. — From Granville Corners through Southwick to Feeding Hills in the town of Agawam, about 12 miles.

On this route the Commission has co-operated with both Granville and Southwick in past years, building about 2 miles of gravel road in each town.

In 1915 and 1916 about 1,800 feet of gravel road, on a stone foundation, were constructed.

A survey has been made from Feeding Hills to Southwick village.

No. 10. — From South Deerfield through Conway to Ashfield, thence through Spruce Corners to Lythia in the town of Goshen, to connect with the highway between Pittsfield and Northampton (see Route No. 2).

The work done on this route in 1915 is set forth in the report for that year, pages 102 and 103.

In Conway a contract was made for the improvement of the road from the Ashfield line toward Conway. Over $1\frac{1}{4}$ miles of gravel road, 18 feet in width, have already been constructed.

In Ashfield one small concrete bridge with a 17-foot span has been constructed on the road to South Ashfield, and a contract has been let for the construction of another bridge with a 22-foot span farther along on this route.

The road has been completed from Ashfield Center to South Ashfield, about 2,600 feet of gravel road having been constructed.

The town has taken the contract for the construction of a portion of the road from South Ashfield toward the Conway line, and work has been going on as rapidly as possible with the forces available.

Work has also been begun on the road up the hill from the main street toward the creamery. The town took the contract for the construction of a section of road, about three-quarters of a mile in length, to connect with the section of road on this route that was improved under the "small town" act in 1914. A gravel road, 18 feet in width, on a suitable foundation is being constructed. This contract was sublet by the town. Over 1 mile of road had already been improved under the "small town" act. Beyond this nearly 1 mile of gravel road has been constructed.

Another section has been constructed by another gang working on a force account, beginning at Spruce Corners and working toward Lythia, over half a mile having been built. The grading has been done on a much longer section.

Still another gang has been working in Goshen, extending from Lythia toward Spruce Corners. About three-quarters of a mile more has been practically completed, and the grading has been done on over a quarter of a mile.

This road is mostly over a bad, wet soil, so that a stone foundation is necessary. Also there is a good deal of rock and other excavation, making the work slow and expensive. Gravel has been used on all these sections.

The sum of \$53,518.81 was spent on this route in 1916.

No 11. — From Northfield through Gill to Turners Falls, about $6\frac{2}{3}$ miles, most of which is in the town of Gill.

There is about a half a mile of road, built by the town and State under the "small town" act nine or ten years ago, that needs resurfacing. There is also over a mile of gravel road on

this route that was built in the same manner, from 1909 to 1914, that is in fairly good condition.

Surveys have been made of other portions of the road on this route, but specifications for the work have not yet been prepared.

No. 12. — From Athol to Worcester through Petersham, Barre, Oakham and Rutland.

It is about 26 miles from Worcester to Athol by this route. There are approximately 11 miles of State highway on this route, and a good many more miles had been improved under the "small town" act and with motor vehicle fees, the towns and the Commission co-operating. This is fully set forth in the 1915 report, on page 103, etc.

The Commission has been using motor vehicle fees to help Athol and Petersham to oil the road that had been improved.

A contract was let in 1915 for the construction of about $2\frac{1}{4}$ miles of a local-stone macadam road in Rutland and about three-quarters of a mile of gravel road in Oakham. These roads were completed and open to travel early in the season and were coated with light oil, as was nearly all of the road on this route.

In Barre the Commission resurfaced about $1\frac{3}{4}$ miles of the old State highway which was nearly worn out.

In Petersham a water-bound, local-stone macadam road was constructed in 1915 on the road between the Barre line and the town, and in 1916 this work was extended. About $2\frac{1}{4}$ miles of road have been constructed and coated with light oil.

A new bridge was needed on this route in Petersham, also a section of road 700 feet long had to be built. The town voted to appropriate \$1,500 toward the cost of this work, and a contract was let for the construction of a concrete bridge with a 25-foot span and the necessary approaches. The estimated cost of the work was \$3,000, and the Commission agreed to bear any additional expense that was necessary to complete the work. The bridge is practically completed.

The sum of \$36,629.27 was expended on this route in 1916.

No. 13. — From Worcester to Milford through Grafton and Upton, to connect with a main highway to Cape Cod.

There are on this route about $3\frac{1}{2}$ miles of State highway between Worcester and Grafton, and about $1\frac{1}{2}$ miles in Mil-

ford. Also quite a stretch of gravel road had been built in Upton under the "small town" act.

A contract was let in 1915 for the construction of over 4 miles of road between West Upton and Grafton Center, and work was begun in the fall of 1915, the surface being of gravel mixed with asphalt, 18 feet in width. About $1\frac{3}{4}$ miles of road have been completed in Grafton, and a little over a mile has been completed in Upton.

The contract was let at extremely low prices, and at a time when laborers could be secured for \$1.85 or \$2 a day. When this spring came, labor became scarce and could not be secured under \$2.40 to \$2.60 or even \$3 a day. Consequently, the contractor was losing a great deal of money. He claimed, also, that the quantity of materials to be moved were exceeding the quantities advertised in the estimate on which he made his bid, and that he ought to be allowed to stop work when he had performed as much as the estimate called for. At any rate, he wished to be allowed to stop work this year at a certain place, hoping for better conditions next year if he had to go on. This contractor had done extremely well, pushing along not only this road but others that he was building for the Commission, so the Commission thought it was only fair to allow him to stop working, for the present at least, when he had completed the sections above mentioned.

On the road between Upton and the Milford line considerable work had been done in past years under the "small town" act. The remainder of the road had blind curves, was very narrow, and careful surveys were required to see if it could not be relocated and a better alinement secured. It turned out, however, that any relocation would be extremely expensive, and would not be enough better to warrant the additional expense on this road. Consequently, the Commission decided to follow substantially the existing road, widening the curves and the road, and straightening it as much as was reasonable.

A contract was advertised and let, and the work has progressed extremely well. Over 1 mile of road is completed, and on $1\frac{1}{2}$ miles more the grading has been partially completed. Much ledge had to be removed to widen the road and to improve the curves.

A gravel road, 18 feet in width, is being constructed and is to be coated with light oil. The gravel obtainable is not of extremely good quality, so that it is possible that some stronger surface will have to be put on the road. None of the work that is being done will be wasted, however, because the gravel would be necessary as a base in any event.

At the present time it is impossible to estimate how many miles of the roads called for in chapter 221 can be constructed with the money available, and so it is impossible to decide how expensive a road can be built in each place.

The Commission understood at the time the bill was recommended, and the amount of money was determined upon, the idea was that gravel roads only should be built wherever gravel could be obtained, and that only such of the roads should be built on any route as had not as yet been improved, and then not on village streets. The estimated mileage to be built and the estimated probable cost were made on this basis.

The sum of \$45,163.19 was spent on this route in 1916.

No. 14. — From Warwick to Orange, to connect with the main highway.

The road in Orange is a little more than $1\frac{1}{2}$ miles in length. A contract was let to the town in 1915 for the construction of a gravel road, and something over one-half a mile was graded and surfaced with gravel. The work was continued this year, and the whole length of the road in Orange has been completed. The cost was approximately \$5,000 for both years' work.

In Warwick there are about $4\frac{3}{4}$ miles, of which over $1\frac{1}{2}$ miles were improved under the "small town" act from 1904 to 1911. Most of this road will have to be resurfaced in the near future.

The rest of the road has been surveyed, so that work can be started next year.

No. 15. — From Blandford to Woronoco in Russell, to connect with the main highway, about 3 miles.

The contract for the construction of this road in Russell was made in 1915, and 5 small concrete bridges and several culverts were built. The work progressed satisfactorily this year, the road being completed, though a little more rolling may be needed in the spring. A trap-rock macadam road, 15 feet in width, has been constructed on a stone foundation. As the

country through which this road runs is hilly and the natural soil of poor quality, extensive grading and drainage work were necessary, the cost of the work done in 1915 and 1916 amounting to about \$49,000. An excellent road has been secured, with fairly good grades and good alinement. It will be oiled in the spring.

In Blandford a macadam road from Blandford Center to the Russell line, nearly 3 miles, was constructed by the town and the Commission jointly, the town and private individuals raising over one-third of the cost, and the Commission allotting \$27,000 from the motor vehicle fees.

There is now an improved highway all the way from Woronoco to Blandford Center.

No. 16. — From the State highway in Wales, southerly to the Connecticut State line, about 4 miles.

About $1\frac{1}{4}$ miles of State highway were built over fourteen years ago between Brimfield and Wales.

In the performance of this year's work in Wales the Commission had to rely largely on the local labor and teams, and the work was done on a force account. About 1,100 feet of gravel road, 15 feet in width, have been nearly completed, and some grading done beyond. The cost of the work done in 1916 was \$4,299.31.

The work will be resumed in the spring and pushed to completion as rapidly as possible.

No. 17. — From West Chesterfield to Chesterfield and Williamsburg; also, from the Williamsburg line over Mains Hill to a point at or near the village of Florence in Northampton, not exceeding 2 miles.

It is over 8 miles from West Chesterfield to the State highway in Williamsburg. Over 2 miles of this road in Chesterfield and about 1 mile in Williamsburg have been improved in past years under the "small town" act. Work was done in both towns this year, with local labor and teams working on a force account. A gravel road is being constructed on a stone foundation.

In Williamsburg, beginning at the improved road, over one-half of the work has been done, but there is about a quarter of a mile to be built next year. In Chesterfield the work has been continued from where it was left off in 1915, and the road has

been graded all the way up the hill to the town, and all the culverts have been put in. The whole section has been surfaced with gravel, except for about a quarter of a mile up the hill, which will be completed early next year. The expenditures this year amounted to \$14,354.87.

No work has been done as yet between Chesterfield and West Chesterfield.

No work was done on Mains Hill in Northampton this year, although surveys and estimates were ready. Because of the unusual labor conditions it was impossible to let a contract at reasonable prices.

As the Commission stated last year, it seemed advisable on these routes in the five western counties to employ local labor and teams as far as possible and to develop local foremen, the knowledge of road-building thus acquired being of immense value to the communities in the performance of the local road work.

An additional and conclusive reason this year, in most places, was the scarcity and the high price of contract labor, and the impossibility of securing reasonable contract prices. The local labor also was very scarce in many places, and very high wages were paid, especially when crops were being harvested, and in many places the road work practically stopped during the harvesting of the crops. Consequently much less work was accomplished than if conditions had been normal.

AUTOMOBILE DEPARTMENT.

Fees.

During the year 1916, 136,809 automobiles and 10,713 motor cycles were registered, as against 102,633 automobiles and 9,520 motor cycles registered in 1915. In addition to the foregoing there were 1,977 manufacturers' and dealers' registration certificates issued in 1916, including 32 motor cycle dealers.

The amount of fees collected for automobiles was \$1,238,-376.50, or an average of \$9.05 for each automobile, the average fee collected in 1915 being \$9.48.

For the 1,977 manufacturers' and dealers' registrations, \$59,438.50 was collected. The fees collected for the registration of motor cycles amounted to \$20,582, and the fees collected for

operators' licenses, examinations and sundries amounted to \$246,062.81.

During the year, 45,975 operators' licenses were issued, and 82,662 operators' licenses were renewed. The number of chauffeurs' licenses issued was 10,928, and the number of chauffeurs' renewals issued was 32,031. There are, therefore, 171,596 persons licensed to operate automobiles in this State, an increase of 37,661 over 1915.

The total amount collected from registration fees, license fees, sundry receipts, interest, etc., was \$1,564,353.81, an increase of \$358,933.62 over the amount collected in 1915. From this amount had to be paid the cost of number plates, salaries of clerks, investigators, examiners, etc., in the automobile department, as well as many other expenses, rebates, etc.

Eighty per cent. of the balance of the money is by law available for the maintenance and repair of State highways, and 20 per cent. is available for the repair, improvement and construction of roads on through routes in towns, under the provisions of chapter 525 of the Acts of 1910.

For further details relating to registrations, licenses, fees, etc., see Appendix A.

Examinations for Licenses.

The examiners of the Commission held 12,506 examinations during the fiscal year 1916. This was an increase of 2,013 over the preceding year.

Of the 9,232 persons examined, 8,628 finally succeeded in passing the examinations and 604 failed; while in 1915, 7,366 persons were examined, 633 of whom failed to pass. Almost all of the failures were on the road test. The fact that 604 of the persons examined could not pass the examination on the road test shows the unfitness of the applicants. The examination is entirely fair and practical, and the road test required is not unduly severe. It consists merely of operating the car under ordinary traffic conditions.

Special Regulations.

The Commission's reports for the years 1912, 1913 and 1915 contain synopses of the special regulations in effect throughout the State. The regulations approved by the Commission in 1916 are as follows: —

Haverhill. — Making Lafayette Street, Bradford district, a one-way street from Ferry Street to Main Street; vehicles entering from Ferry Street only.

Salem. — Making the following streets one-way streets: Washington Street, west from Essex Street to Barton Square, and from Barton Square to the end of the tunnel; Barton Square, from Essex Street to Washington Street west; Howard Street, going from Brown Street to Bridge Street.

Automobile Hearings.

These hearings are held either upon complaints or as a result of investigations made by the Commission's investigators, or at the request of the operators whose licenses have been suspended or revoked. Such hearings have occupied the entire day on Wednesday of each week, and often other days in the week as well. During the past year the Commission held 475 such public hearings, the number in 1915 being 432.

In addition to these the Commission receives every week a large number of reports of investigations made by its inspectors. These are read and acted upon. There were 1,470 such reports made in 1916, as against 1,279 in 1915. In 1916 the Commission's investigators prosecuted 78 operators in the courts.

During the year, 14 operators or chauffeurs were placed on probation by the Board, and were required to report regularly for a certain period, at intervals of a month or so, to some particular officer. Of the persons so placed on probation, 9 reported regularly, and 5 had their licenses taken away for failure to keep the terms of their probation.

Examination of Garage Records.

During the year inspections were made of 423 garages and dealers' places of business, to ascertain if they were complying with the law. Where violations of the law were reported by the inspectors, cautionary letters were written if the neglect appeared to be accidental; in the more serious cases some were prosecuted in court; and in some instances, the proprietors were summoned before the Commission to show cause why their licenses to operate or their registration certificates should not be suspended or revoked.

Suspension and Revocation of Licenses.

The following summary shows the action taken by the Commission in the various cases in 1915 and 1916, and the causes of said action:—

Action taken on Formal Complaints after Hearing.

	1915.	1916.
Licenses revoked,	—	3
Licenses suspended,	31	34
Registration certificates suspended,	1	—
Dealers' registration certificates revoked,	—	1
Dealers' registration certificates suspended,	—	2
Complaints placed on file,	14	30
Complaints dismissed,	13	14
Operators cautioned,	3	3
Total hearings on formal complaints,	62	87

Suspensions and Revocations.

	1915.	1916.
Licenses revoked,	303	514
Licenses suspended,	615	641
Rights to operate in Massachusetts suspended,	181	232
Registration certificates suspended or revoked,	5	1
Registration certificates canceled,	—	—
Motor cycle registration certificates revoked,	6	1
Motor cycle registration certificates suspended,	2	—
Dealers' registration certificates suspended,	—	2
Dealers' registration certificates revoked,	4	5
Dealers' registration certificates canceled,	37	—
Total suspensions and revocations,	1,153	1,396
Suspensions and revocations resulting from court convictions,	454	638
Suspensions and revocations after hearings on formal complaints,	32	40
Suspensions and revocations after investigation, on which hearings were given in some cases.	667	718
	1,153	1,396

Causes of Suspensions and Revocations.

	1915.	1916.
Reckless operation,	167	203
Operating while under influence of intoxicating liquor,	202	320
Refusing or neglecting to stop after accident,	41	51
Accidents resulting in death,	299	332
Improper operation,	184	169
Three overspeeding convictions,	4	2
Operating auto without owner's permission,	74	93
Improper person,	115	124
Other offences,	67	102
	1,153	1,396

In 16 cases where persons were convicted of operating recklessly, while under the influence of intoxicating liquor, and of other offences under the provisions of section 22, chapter 534 of the Acts of 1909, as amended by chapter 290 of the General Acts of 1916, the Commission adopted the recommendation of the courts that the licenses be not revoked.

Deaths.

In 1916 there were 306 fatal accidents in Massachusetts in which motor vehicles were involved, resulting in 313 deaths. There were 16 accidents in other States in which Massachusetts operators were involved, causing 18 deaths: 4 of these deaths occurred in New Hampshire, 6 in Connecticut, 4 in Maine and 4 in Rhode Island. These accidents were investigated because Massachusetts operators were involved, the total number of such persons being 338.

The fatal accidents were disposed of as follows, the figures for 1915 being also given:—

	1915.	1916.
Licenses revoked,	69	69
Motor cycle registration certificates revoked,	1	-
Licenses suspended, and reinstated after investigation and hearing,	120	151
Motor cycle registration certificates suspended, and reinstated after investigation and hearing.	1	-
Licenses suspended, final hearings pending,	45	51
Motor cycle registration certificates suspended, final hearings pending.	-	-
Rights to operate in Massachusetts suspended, and, after investigation, serious fault found.	18	12
Rights to operate in Massachusetts suspended, and reinstated, .	11	9
Rights to operate suspended, final disposition pending,	-	9
No action, because operator had no Massachusetts license or registration certificate.	2	-
No action, because operator was unknown,	8	6
No action, because of death of operator,	35	31
	310	338

What Causes the Accidents in which Motor Vehicles are involved, and how can they be prevented?

The Commission felt that this subject was one which should be carefully investigated, because it believed that such an investigation would be of great value in determining the cause of most of the accidents and how and by whom they could be prevented.

The public has many erroneous ideas as to what causes automobile accidents. This is only natural, because the spectacular accident is, of course, featured in the newspapers, as are many of the accidents when a drunken operator is involved, or where a person is killed or injured and the operator gets away without being identified.

The impression thus gets abroad that most of the accidents are caused by reckless or drunken operators running at excessive speeds, and that many operators are never caught. These impressions are not correct in fact in any large proportion of the accidents.

The Commission has employed trained investigators for the last eight or nine years, who have made exhaustive investigations as to all the facts connected with the more serious motor vehicle accidents, and have made full reports in writing of all the evidence, the statements of the witnesses, etc., to the

Board. These have been read and acted upon each week. It is safe to say that the real facts in the vast majority of the cases investigated are established beyond the possibility of a doubt.

In the majority of cases the marks on the ground or elsewhere, the place where the motor vehicle stopped, how they came together, etc., the marks or injury done to the motor, all facts capable of being accurately ascertained, make the determination as to how the accident happened and who was to blame conclusive.

It seems evident that an examination of these exhaustive reports by trained experts, and a report by them as to where these accidents happened and under what circumstances, as well as how they could be prevented, would certainly be of great value and would come as near as it is possible to ascertain correctly the causes of these accidents.

The Commission felt that it should cause such an investigation to be made, because, so far as it is aware, Massachusetts is the only State which has made any such thorough investigation of accidents or has had careful reports made of all the evidence obtainable.

It therefore directed its chief examiner and investigator, Mr. F. L. Austin, who has been in charge of that department ever since it was started, to select some of his assistants to do the work. He selected six of the investigators, and directed them to take the reports in 675 of the more serious cases where persons were killed or injured, and, after reading them carefully, to determine and report where, how and when these accidents happened; the causes of the accident; and who, in their opinion, was to blame, and why; also how the accident could have been prevented.

It was manifestly impossible to examine all the thousands of reports that are on file, but these 675 selected from the files would evidently be a fair basis on which to make reasonably accurate deductions as to the cause of accidents, etc.

These six investigators spent about two weeks in reading and tabulating the reports. Their report is so comprehensive and clearly states so many facts that the Commission is printing it in full hereafter as a part of its annual report. A careful reading of this report will bring many interesting facts to light and

will correct many erroneous impressions. It clearly shows where the accidents happen, and often it shows why and how they could have been prevented.

The Use of Intoxicating Liquor did not cause Many Accidents.

Out of the 675 cases examined, the operators were believed to be intoxicated in 42 instances only, or in just about 6 per cent. of all the cases. The use of intoxicating liquor had nothing to do with the accidents in the other 633 cases.

In 20 instances out of the 42 in which the operator was believed to be intoxicated, the operator or occupants of the motor vehicle were the only persons killed or injured. In 22 cases people outside of the motor vehicles were killed or injured.

There were only 34 other cases in which any one even suggested or claimed that the operator had been drinking. In these 34 instances the operator could not deny that he had had a drink, but there was nothing either in the accident itself or in his method of operating or conduct which in any way indicated that drink could have had any effect in causing the accident.

• Where and when do Accidents occur?

More accidents occur in the daytime than at night. There were 401 in the daylight and only 274 were in the dusk or after dark.

Twice as many accidents occur on city and town streets as happen on country roads. There were 450 accidents on these streets, and only 225 on the country roads.

What Operators have the Accidents?

Seven hundred and thirty-six male operators were involved in these accidents, and only 24 women operators. Male operators had thirty times as many accidents as did female operators, although licenses have been issued to more than 11,000 women.

In a good many of the cases more than one operator was involved, *e.g.*, in 63 collisions at street intersections.

Chauffeurs and Private Operators.

Chauffeurs were involved in 246 cases; Massachusetts private operators in 437 cases. In 54 cases Massachusetts men holding no license were involved, and in 18 cases residents of other States who held no license were involved, as well as 5 licensed operators from other States.

Apparently the 43,959 chauffeurs have a slightly larger percentage of accidents than do the 128,637 licensed private operators, but the difference could easily be accounted for by a larger mileage, more operation in bad weather, etc.

Trucks and Commercial Vehicles cause proportionately More Accidents than do Motor Cycles or Automobiles.

In the 675 cases examined the following facts appeared:—

	Registered, 1916.	Per Cent.
Automobiles,	118,615	80
Trucks and commercial vehicles,	18,194	12
Motor cycles,	10,713	8
	147,522	

	Involved in Accidents.	Per Cent.
Automobiles,	559	74
Trucks and commercial vehicles,	140	18¾
Motor cycles,	43	5¾
Miscellaneous,	13	1½

From the above tables one can easily see that motor trucks and commercial vehicles cause 50 per cent. more accidents per vehicle than do any other class of motor vehicle, and that motor cycles cause the fewest.

For this comparison the Commission has not included the cars registered by manufacturers or dealers, because it is hard to determine the number of vehicles in use by each dealer.

Fatal Accidents in which Motor Vehicles were involved.

In the 675 reports that were examined, 376 people were killed in 369 accidents. In 40 of these cases the operators and 71 other occupants of the motor vehicles were killed. Twenty-six of these operators and 29 of the occupants were killed on city or town streets. Twenty-seven of the operators and 42 of the occupants were killed on country roads.

As has been shown above, more than half of the accidents, in which the motor vehicle is being operated at a speed in excess of 18 miles an hour, occur on the country roads. Consequently excessive speed appears to be responsible for many of these accidents.

Women Operators are seldom involved in Fatal Accidents.

Women operators were involved in only 8 out of the 369 cases in which fatal accidents occurred. In only 1 of these cases was the woman operator held at fault.

There are now over 11,000 women licensed to operate motor vehicles in this Commonwealth. Only 27 women operators were involved in the 675 accident cases examined. As above stated only 1 was at fault in a fatal accident, though 14 were held to blame in the less serious cases.

This certainly indicates that women are unusually careful operators, being involved in only 4 per cent. of all the accidents although they constitute about 8 per cent. of the licensed operators. They were held "not at fault" in 7 out of 8 fatal accidents.

Although about 8 per cent. of the licensed operators are women, they were involved in only 2 per cent. of the fatal accidents.

Fatal Accidents to Pedestrians.

The investigation indicates several facts very clearly. Four times as many pedestrians are killed on city and town streets as on country roads. In the 675 cases examined, 402 pedestrians were killed or injured, and 22 other users of the highway were killed who were not in the motor vehicles.

The examination of these accident reports shows that in the

265 cases in which 243 pedestrians and 22 others were killed, the pedestrian or other user of the highway was wholly at fault in 162 cases and partly to blame in 43. The operator was wholly at fault in 51 cases, and partly to blame in 43. In 6 cases the facts could not be ascertained, and in 3 the accident was practically unavoidable.

Two hundred and five deaths out of 265 would not have occurred if reasonable care had been exercised by the deceased. The operator was at fault in 94 of these cases, but 43 of these accidents could have been prevented by the exercise of ordinary care by the deceased.

In more than half of all the cases in which pedestrians and other users of the highway outside of the motor vehicle were either killed or injured, the accident would not have occurred if the ordinary precautions had been taken of looking before crossing.

Excessive Speed does not cause the Majority of the Accidents.

In the 675 cases examined the following facts appeared as to the speed at which the motor vehicles involved in the accidents were going (many of these were going only 5 or 6 miles an hour): —

Slowly (under 12 miles),	218
Medium (12 to 18 miles),	215
Fast (18 to 25 miles),	134
Excessive (over 25 miles),	108

From this it appears that in 433, or in nearly two-thirds of these cases, the motor vehicle was going at less than 18 miles an hour. In only one-sixth of the cases was the vehicle exceeding a speed of 25 miles an hour.

The accidents happened on city streets in 327 of the above 428 cases where the motor vehicle was proceeding at a slow or medium speed.

In only 40 cases of the above 108, in which the motor vehicle exceeded a speed of 25 miles an hour, did the accident occur on city streets.

Nearly one-half of the accidents occurred on country roads when the motor vehicle was going at a speed of from 18 to 25

miles an hour, and more than three-fifths of the accidents in which the speed exceeded 25 miles an hour were in the country.

There were 103 cases in which the speed was excessive under all circumstances. Seventy of these accidents occurred on city streets.

There were 63 collisions at street intersections where the accident would certainly have been avoided if the operators had both been careful and had operated properly. Often both operators were at fault.

Operators seldom try to escape after an Accident.

Only 39 operators went away without stopping after causing any accident, and all but 8 of these were subsequently identified. In several instances it was doubtful if the operator knew that he had caused any accident.

Only 8 of the operators involved in these 675 accidents remain unidentified and unpunished, and in none of these 8 cases did any one know the registered number of the motor vehicle. Six of these 8 accidents happened at night.

Very Few Accidents are caused by Defects in the Motor Vehicle.

Among these 675 cases there were only five instances in which the motor vehicle was out of order. In two the brakes were out of order; there was one broken chain, one broken spring, and one side car broke away from a motor cycle.

The operators claimed that the accidents were caused by defects in quite a few cases, but the investigators believed that the defect existed after the accident but not before.

The Operator is usually at Fault in Collisions with Other Vehicles.

There were 24 collisions with street cars. The operator of the motor vehicle was "at fault" in 21 cases, and "not at fault" in 3.

There were 41 collisions with teams. The operator of the motor vehicle was "at fault" in 40 cases, and "not at fault" in only 1 instance.

How to prevent Accidents — Summary.

Two hundred and five of the fatal accidents would have been prevented by the exercise of reasonable care on the part of the pedestrian or other user of the highway. The operator should have prevented 94 of these accidents, but the other person also could have prevented 43 out of the 94. The operator could and should have prevented 11 accidents in which people were killed in a collision with a team or electric car.

Forty operators and 71 occupants of motor vehicles were killed in these accidents. Probably no accident would have occurred in a large proportion of these cases if the operator had been operating carefully and had not taken too many chances, gone too fast under all the conditions, etc. In a small proportion of these cases possibly the fault was excusable and the conditions could not have been anticipated by a reasonably prudent operator.

Accidents caused by Motor Cycles.

There were 43 such accidents. The motor cycle operator was killed in 12 of these accidents, and injured in 18, and outsiders were killed in 8 and injured in 5.

The motor cyclist himself was killed or injured in 30 cases, whereas only 13 outsiders were either killed or injured in accidents in which motor cycles were involved.

Operators in Fault, Licenses suspended or revoked.

There were 760 operators involved in these 675 accidents covering the serious accidents in a period of about fourteen months. (Several accidents were involved in a single accident; for instance, in 63 collisions at street intersections.)

The operator's license was revoked in 162 cases, was suspended in 231, his right to operate was suspended in 37, he was blacklisted in 11, he was killed or unknown in 48 (8 of these were unknown), and he was slightly to blame in 2. The operator was held "not at fault" in 269 cases.

In 441 cases the operator's right to operate, for a time at least, was taken away; in 40 more cases he was killed.

These facts clearly indicate that Massachusetts is doing a great deal to prevent reckless and improper operation on her highways.

Of course many more licenses were suspended or revoked because the operator was convicted in court of various serious offences, but in these 441 instances the right to operate a motor vehicle was taken away by the Commission as the result of an investigation made by the investigating department.

So far as the Commission is informed, there is no other State or country in which any such thorough investigation is made or in which the department itself has any large number of investigators.

Last year the Commission wrote to the official in charge of the issuing of licenses to operators of motor vehicles in the thirteen States in which some regulation of the operators might be expected. In all those thirteen States, 960 licenses had been suspended or revoked. In some of the States the record covered a period of from three to nine years, and in a few States the record covered only one year.

In Massachusetts 1,099 licenses and rights to operate were suspended or revoked in 1915, and during the present year 1,387 licenses or rights to operate were suspended or revoked.

During the last eight and a half years, the investigating department has investigated and made reports in 4,880 cases.

The Commission has revoked 1,733 licenses to operate motor vehicles, has suspended 3,102 such licenses, and has taken away the right to operate from 447 persons. (It has had authority to suspend the rights of unlicensed operators only since the middle of 1914.)

Five thousand two hundred and eighty-two licenses or rights to operate have been suspended or revoked by the Commission since the investigation of accidents, etc., and the employment of investigators was authorized by the Legislature in 1908.

The work of the examining and investigating department, since the Commission was authorized by the Legislature in 1908 to employ investigators, is well shown by the following table: —

YEAR.	Autos regis- tered. ¹	Motor Cycles regis- tered.	Number of Persons killed.	Number of Persons injured.	Licenses sus- pended.	Licenses revoked.	Rights sus- pended.
1908,	18,052	1,917	13 ²	486 ²	51	44	—
1909,	23,971	2,394	54	989	132	68	—
1910,	31,360	3,370	77	963	198	90	—
1911,	38,907	3,658	110	1,248	254	95	—
1912,	50,132	5,034	142	1,962	325	190	—
1913,	62,660	7,127	188	2,923	365	198	—
1914,	77,246	8,161	229	4,010	521	231	34
1915,	102,633	9,520	294	6,197	615	303	181
1916,	136,809	10,713	315	9,131	641	514	232
	541,770	51,894	1,422	27,909	3,102	1,733	447

¹ Includes trucks and commercial vehicles.

² From July, 1908, to Dec. 1, 1908.

During these eight and one-half years, 4,880 cases have been investigated. This year reports were made covering investigations in 1,470 of these cases.

The number of motor vehicles registered, including motor cycles, increased from 112,153, in 1915, to 147,522, in 1916, an increase of $37\frac{1}{2}$ per cent.

The number of people killed in accidents in which a motor vehicle was involved increased from 294, in 1915, to 315, in 1916, an increase of 7 per cent. The motor vehicles increased more than five times as fast as the fatal accidents increased.

Another way of stating this is that in 1915 there was 1 fatal accident for every 381 registered motor vehicles, while in 1916 there was 1 fatal accident for every 468 registered motor vehicles.

This certainly indicates more care and caution on the part of some one; probably both the operator and the other users of the highway are more careful.

It is interesting to note the number of deaths each year in proportion to the number of motor vehicles registered. (For the purposes of this comparison dealers' cars are not included, because it is hard to ascertain their number.)

YEAR.	Motor Vehicles.	Fatal Accidents.	Number of Vehicles per Accident.
1909,	26,365	54	488
1910,	34,730	77	451
1911,	42,565	110	387
1912,	55,166	142	388
1913,	69,787	188	371
1914,	85,407	229	373
1915,	112,153	294	381
1916,	147,809	315	468

As already shown, many of these fatal accidents could and should have been prevented by the operator, and many of them could and should have been prevented by the pedestrian, had each one used the reasonable care and caution that the circumstances required at that particular place and time. No comparison has been made as to the number of injuries reported, because there is no fair basis for comparison.

Since the law was passed requiring every operator involved in an accident to report it to the Commission, if any person or property is injured, thousands of letters reporting all sorts of trivial accidents have been received. Last year some 16,000 letters were received reporting accidents, and a great deal of time was consumed in acknowledging their receipt and filing them. All the serious accidents which should be investigated and which require action are undoubtedly brought to the attention of the investigating department by the police and the press, especially now that there are 14 inspectors, each assigned to cover a small territory.

Accidents on the Streets of Boston.

The Commission has always felt that while the record of deaths resulting from motor vehicle accidents was accurate, the records of less serious accidents and those of a trivial nature were of little value for the purposes of comparison with the records of accidents in other places; a vast majority of the 16,000 letters received in 1916 relating to accidents in which mudguards were bent, headlights broken, etc., were due to slight collisions.

Team drivers, pedestrians, etc., do not have to report such accidents to any one. In most if not in all other places, the reports of accidents and of the vehicles involved, or persons killed or injured in such accidents, are taken from the police reports. These reports furnish an impartial and comprehensive record of all the more serious accidents.

Feeling that the accidents which occurred in the streets of Boston, where a complete record is kept, would furnish a fair criterion on which to form a judgment of what is happening elsewhere, the Commission has for several years obtained the record of such accidents from Mr. O'Meara, the police commissioner.

The number of automobiles and trucks registered in this State increased from 102,633, in 1915, to 136,809, in 1916, an increase of over 33 per cent. More than 18,000 motor trucks and commercial vehicles are included in these figures.

The number of motor cycles registered increased from 9,520, in 1915, to 10,713, in 1916, an increase of $12\frac{1}{2}$ per cent.

During the last tabulated year 124 persons were killed and 1,784 were injured on the streets of Boston by accidents due to the traffic of various kinds.

The following deaths and injuries were due to traffic: —

	1915.		1916.	
	Deaths.	Injuries.	Deaths.	Injuries.
Teams, bicycles, etc.,	14	405	18	390
Street cars,	8	373	55	366
Motor vehicles (including trucks), . .	45	852	48	981
Motor cycles,	1	12	3	15

The tremendous increase in the number of deaths due to street cars is undoubtedly due to one accident in which a large number of people were killed when an electric car ran off an open drawbridge.

The figures in the foregoing table clearly indicate that the relative number of accidents due to motor vehicles is decreasing.

The number of automobiles and trucks increased over 33 per cent. during the year, while the number of deaths caused by

them only increased 7 per cent. and the injuries only 15 per cent.

Taking the State as a whole, the increase in the number of fatal accidents caused by motor vehicles (including motor cycles) has not been nearly as great as the increase in the number of motor vehicles registered. The fatal accidents increased only 7 per cent. while the motor vehicles (including motor cycles and automobiles) registered increased over 37 per cent.

Accidents on the Streets of New York City.

The "Police Bulletin," published by the police department of New York City, for the month of November gives the following statistics:—

Street Accidents in which Persons were killed or injured during November, 1915, and November, 1916.

November, 1915,	1,648
November, 1916,	1,992

This report covers accidents of all kinds occurring in the streets of New York City. There were 67 deaths due to November accidents, and only 3 due to September and October accidents. The report states that this is a very heavy increase in November, and proceeds as follows:—

The principal kinds of accidents responsible for deaths were: persons struck by street cars, 7; by passenger autos, 19; by motor trucks, 25; by horse-drawn vehicles, 9.

The motor trucks need sharp watching.

Study the following comparison:—

	DEATHS.	
	1915.	1916.
August,	13	9
September,	6	12
October,	12	12
November,	4	25

More attention should be given to elderly people. Of the 67 people killed, 21 were over fifty years old.

During the month of November, 1916, 44 persons were killed on the streets of New York City by automobiles and motor trucks, while on the streets of Boston only 48 persons were killed by automobiles and motor trucks during a period of twelve months.

The Commission realizes that the city of New York is many times as large as the city of Boston, both in area and population, but the number of fatal accidents in the streets caused by motor vehicles is entirely out of proportion to the difference in size or population, especially when all the people who come into Boston from its adjacent suburbs and who use its streets are also considered.

Most of the streets in New York City are broad, and the intersecting streets usually enter the avenues at right angles; whereas in Boston the streets are narrow, crooked and congested, and in many of the most congested districts the side streets entering a main highway are not opposite each other. On many of the down-town streets in Boston the pedestrians use the roadways during the rush hours, all of which makes conditions in the streets of Boston especially dangerous.

Privileges of Nonresident Motorists.

Under date of July 11, 1916, the Commission passed an order reading as follows: —

The Massachusetts Highway Commission, acting under the provisions of section 3, chapter 534 of the Acts of 1909, as amended, hereby determines that the following-named States and countries grant to motor vehicle owners and operators of Massachusetts privileges similar to those granted by the Commonwealth of Massachusetts to nonresident owners and operators, provided such owner or operator shall have fully complied with all the laws of said Commonwealth relative to the registration of motor vehicles, the licensing of the operators thereof, and the display of registration numbers, lights and other devices; the extent of the privileges so granted by the respective States and countries being as follows: —

States.

Alabama. — The whole year unless the motor vehicle is let for hire, or until the Massachusetts owner or operator acquires a regular place of abode or business in that State for a period of more than thirty days during the calendar year.

Arizona. — Six months. (The sheriff of the county or counties in which the motor vehicle is operated must be immediately notified and evidence given that the owner of the motor vehicle has complied with the laws of his home State.)

Arkansas. — Unlimited. (Must display number plates and lighted lamps substantially when and as required by law in Massachusetts.)

California. — Ninety days. (Owner must apply for registration within ten days, and secure and display register device, which he must return within three months.)

Colorado. — Ninety days. (Owners must have Massachusetts certificate, license and number plates with them, and must apply for and receive a visitor's license, which is good for ninety days and is issued without charge.)

Connecticut. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year, and the operator is not convicted in the courts of any violation of any provision of the motor vehicle laws. In either case the right to operate the motor vehicle without registration in Connecticut ceases.)

Delaware. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year. A special license must be secured from the Secretary of State. This is issued without charge upon recommendation of the American Automobile Association.)

District of Columbia. — Thirty days.

Florida. — Thirty days.

Georgia. — Thirty days.

Idaho. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.) The above privilege is not extended to motor vehicles owned by foreign corporations doing business in Idaho nor to operators who are engaged in the business of carrying passengers for hire.

Illinois. — Sixty days. The statute says "temporarily sojourning in this State for a period of sixty days or less."

Indiana. — Sixty days.

Iowa. — "The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.) This exemption does not apply to motor vehicles owned by a "foreign corporation, manufacturer or dealer doing business in this State."

Kansas. — "For a period not exceeding thirty days at a time."

Kentucky. — The whole year. (Must display number plates and have the lights required by law.)

Louisiana. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.)

Maine. — Thirty days.

Maryland. — The whole year, unless they have temporary residences in Maryland for periods in excess of three months in any year. The above

exemption does not apply to "nonresidents engaged regularly in the transportation of passengers or freight for hire wholly or partly in this State."

Michigan. — For a continuous residence of not more than ninety days. The above exemption does not apply to motor vehicles owned by "nonresident corporations doing business in this State."

Minnesota. — Thirty days.

Mississippi. — Sixty days.

Missouri. — Nineteen days.

Montana. — The whole year.

Nebraska. — "A period not exceeding thirty days at a time."

New Hampshire. — Ten days; a fraction of a day counts as a day. A motor vehicle owned by a nonresident may be registered for a term beginning July 1 and ending September 30 for one-half the full term rates.

New Jersey. — "For a period not to exceed fifteen days in each calendar year, or on two or more occasions not exceeding in the aggregate the period of fifteen days in any such year."

New Mexico. — Sixty days.

New York. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.)

North Carolina. — Fifteen days. The above exemption does not apply to "any motor vehicle used for hire by a nonresident."

North Dakota. — Temporarily "while passing into or through this State from an adjoining State."

Ohio. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.)

Oklahoma. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.) This exemption does not apply to a motor vehicle owned by a "foreign corporation doing business in this State."

Oregon. — Thirty days' "sojourn." This exemption does not apply to motor vehicles owned by "nonresident corporations doing business in this State."

Pennsylvania. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.)

Rhode Island. — The whole year, "provided, however, that if said nonresident shall sojourn or be regularly engaged in business in this State for more than ten days in the calendar year, the exemption from registration and licensing herein provided for shall not be granted him."

South Dakota. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.)

Tennessee. — So long as a person remains a tourist. (This information is contained in a letter from the Secretary of State dated June 12, 1916.)

Utah. — Thirty days.

Vermont. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.)

Virginia. — "Not exceeding two periods of seven consecutive days each in each calendar year." This exemption ceases if the nonresident is convicted of violating the provisions of the motor vehicle law.

Washington. — "A period of ninety days in any calendar year." (Provided "that such motor vehicle is not used in this State for hire.")

West Virginia. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.)

Wisconsin. — The whole year. (Provided no regular place of abode or business is acquired for a period exceeding thirty days in any calendar year.)

Wyoming. — The whole year.

Possessions.

Porto Rico. — Five days. Operator must then secure special license issued by commissioner of interior for \$2 a month or fraction thereof for four months.

Dominion of Canada.

Province of Alberta. — Twenty days.

Province of British Columbia. — Sixty days. (Conditioned on giving notice to the superintendent of provincial police and securing certificate of registration.)

Province of Manitoba. — Thirty days. (Conditioned on reporting to the municipal commissioner.)

Province of New Brunswick. — Twenty-one days in any one year.

Province of Ontario. — Twenty-one days. (This reciprocal arrangement made by the lieutenant-governor in council as authorized by law.) Permit must be obtained at the port of entry (no charge).

Province of Quebec. — Not more than three consecutive months.

Province of Saskatchewan. — Thirty days. (Permit must be secured from provincial secretary.)

N. B. — " 'Non-resident' shall apply to residents of states or countries who have no regular place of abode or business in this Commonwealth for a period of more than thirty days in the calendar year." (Section 1, chapter 534, Acts of 1909, as amended.)

A non-resident's right to operate or have operated any motor vehicle in this Commonwealth may be suspended or revoked by the Massachusetts Highway Commission. (Section 3, chapter 534, Acts of 1909, as amended.)

If any "non-resident or his chauffeur or employee be convicted by any court or trial justice of violating any provision of the laws of this Commonwealth relating to motor vehicles or to the operation thereof, whether

or not he appeals, he shall be thereafter subject to and required to comply with all the provisions of this act relating to the registration of motor vehicles owned by residents of this Commonwealth and the licensing of the operators thereof." (Section 10, chapter 534, Acts of 1909, as amended.)

RECOMMENDATIONS FOR LEGISLATION.

The Commission is recommending legislation this year for the following purposes:—

1. To enable the Commonwealth to secure the money appropriated by the Federal government for the improvement of rural highways and post roads.

2. To continue the appropriations for the construction of State highways and "small town" roads.

3. To preserve the Mohawk Trail intact with all its beautiful scenery.

4. To aid the poorer towns in improving and maintaining their highways, and to provide for the constant maintenance, under expert supervision and direction, of the roads therein that are the most used.

5. To make the highways safer by preventing the view from being obscured at corners and curves in the country districts; and to authorize the assessment of a special betterment tax on land adjoining an improved highway when it receives a special benefit from the maintenance of the road, the money collected to be used to pay a portion of the cost of keeping the highway properly maintained.

6. To authorize the Commission, with the approval of the Governor and Council, to appoint some person to hold hearings and take testimony in cases in which motor vehicles are involved, and to delegate to such person the authority which the Commission now has in relation to the suspension or revocation of licenses to operate motor vehicles and the registration certificates thereof, the investigation of accidents, etc.

7. To determine and make certain as to which vehicle has the right of way when two vehicles are meeting or passing upon a highway. This will prevent many unnecessary accidents by providing that a vehicle which is proceeding on its own right-hand side of the traveled portion of the way shall have the right of way.

8. To provide for the revocation of the license of any operator of a motor vehicle who is convicted in court of operating while in an intoxicated condition, or whenever his condition prevents him from operating properly and with entire safety to himself and all other users of the highway.

9. To require the operators of motor vehicles to make a written report of every accident in which such vehicle is involved, in which any person is killed or receives any substantial bodily injury.

10. To authorize the destruction of certain records, reports, letters and papers after they have become worthless because of the lapse of time.

FEDERAL AID IN BUILDING HIGHWAYS.

Under an act passed by Congress and approved July 11, 1916, entitled "An Act to provide that the United States shall aid the States in the Construction of Rural Post Roads, and for Other Purposes," Congress has appropriated the sum of \$75,000,000, which is made available during the next five years to aid the States in building highways.

The sum available in 1916 is \$5,000,000, and the share that Massachusetts is entitled to receive under the terms of the act is something over \$73,000 for this year. The total amount that will be available for Massachusetts is something over \$1,100,000 during the five years.

The act provides that the Secretary of Agriculture and the State highway department of each State shall agree upon the roads to be constructed therein, and the character and method of construction.

The act also provides that no money apportioned thereunder to any State "shall be expended therein until its legislature shall have assented to the provisions of this act, except that, until the final adjournment of the first regular session of the legislature held after the passage of this act, the assent of the governor of the state shall be sufficient."

On August 3, at the request of the Massachusetts Highway Commission, His Excellency Governor McCall assented to the provisions of the act, pending the coming in of the Legislature.

It is necessary that the Legislature should formally pass some act or resolve assenting to the provisions of the Federal statute, in order that this State may secure the benefits and money to which it will be entitled from the government. It should also authorize the Massachusetts Highway Commission to make agreements with the Secretary of Agriculture or other United States officials in regard to the roads to be constructed and the character and methods of such construction, and various other things that are designated and more particularly set forth in the act.

APPROPRIATION FOR THE CONSTRUCTION OF STATE HIGHWAYS.

The Commission suggests that an act be passed in 1917, substantially in the form in which it has been passed in previous years (1903, 1907, 1912), appropriating the sum of \$5,000,000, to be used by the Commission in the construction of highways during a period of five years, one-fifth available each year beginning with 1918. This is the amount appropriated by chapter 704 of the Acts of 1912. In order that the Commission may plan for its work in advance, it is necessary that the appropriation be made at this time.

Naturally, these modern highways are better than those constructed in the earlier years of State road building. Massachusetts has been building roads for twenty-two years, and the older highways should be improved in corners, curves and width. The Commission feels, however, that with \$1,000,000 available each year for construction, in addition to the funds made available for care and maintenance, the roads of this Commonwealth can be kept to a standard of which it need not be ashamed.

The automobilists pay about \$1,500,000 toward the yearly expense of maintaining State highways, and improving, or helping to improve, the through roads in the towns; therefore it seems only fair that the State should make reasonable appropriations for construction and maintenance of State highways and for "small town" roads. In this connection it should be remembered that the counties repay to the State one-quarter of all amounts expended for the construction of these roads, as well as one-quarter of expenditures made for maintenance of State highways, when the money is secured from the tax levy.

It should also be remembered that the cities and towns repay to the State nearly \$200,000 a year of the money expended for repairs of State highways, so that the amount the State ultimately pays out of the tax levy is a very small percentage of the expenditures necessary to keep the highways in reasonable condition.

Within the past few years many States have expended large sums on highways.

Connecticut, with fewer miles of road than Massachusetts, has expended as much or a little more.

California has spent \$18,000,000 since 1910, and has now voted \$15,000,000 to continue the work.

New York State has spent during the past six years a large portion of the \$100,000,000 appropriated.

The "Good Roads Year Book" states the approximate amount of funds available for State highways in 1915 in the various States to be over \$56,000,000. Some of the larger appropriations are available in the following States: —

California,	.	.	.	.	.	.	.	.	.	.	.	\$7,000,000
Connecticut,	.	.	.	.	.	.	.	.	.	.	.	2,300,000
Illinois,	.	.	.	.	.	.	.	.	.	.	.	2,500,000
Iowa,	.	.	.	.	.	.	.	.	.	.	.	1,000,000
Maine,	.	.	.	.	.	.	.	.	.	.	.	1,083,000
Maryland,	.	.	.	.	.	.	.	.	.	.	.	4,572,000
Minnesota,	.	.	.	.	.	.	.	.	.	.	.	1,000,000
New Jersey,	.	.	.	.	.	.	.	.	.	.	.	1,300,000
New York,	.	.	.	.	.	.	.	.	.	.	.	17,000,000
Ohio,	.	.	.	.	.	.	.	.	.	.	.	2,700,000
Pennsylvania,	.	.	.	.	.	.	.	.	.	.	.	5,000,000
Washington,	.	.	.	.	.	.	.	.	.	.	.	1,650,000
Wisconsin,	.	.	.	.	.	.	.	.	.	.	.	1,350,000

MOHAWK TRAIL RESERVATION.

The Mohawk Trail is the name given to the highway recently constructed over Florida Mountain. In fact, the whole road from Greenfield to North Adams is very generally known by that name.

It is one of the finest, if not the finest, scenic routes in New England, running as it does along the Deerfield River valley, then crossing the river and following Cold River to Manning Brook. The trail then ascends the gorge of Manning Brook to the top of the mountain, where it follows the crest of the hill, with magnificent views down the valley of the Deerfield River to the east, and up the valley to the north among the Vermont mountains.

The road then crosses the mountain and descends to the city of North Adams, with a most beautiful view of the Berkshire valley.

The Commission suggested in its report in 1914 that it would, in its opinion, be wise to make a State reservation there; that the trees upon the mountain sides along Cold River and Manning Brook not only added greatly to the beauty of the landscape, but were a great protection to the road itself by holding the soil and preventing landslides; that over 100,000 cubic yards of earth had come down on to the road from such slides and had had to be removed at large expense; and, in its opinion, the expense of retaining the roadside, or removing the material that would slide down if the trees were cut, might easily in a few years exceed the whole value of the land.

Along the crest of the hill it suggested that enough land should be secured to preserve the woods along the roadsides on the upside and to preserve the views on the downside, and to prevent the erection of advertising signs and unsightly structures. Across the mountain a sufficient width should be taken to preserve the trees on the roadside and keep it free from disfigurement. On the North Adams side enough land could be taken to preserve the view for all time, free from unsightly structures.

Already many large advertising signs have been erected, and more are constantly being put up.

At the present time the land is of little value. The Forestry Commission, acting under the direction of the Legislature of 1914, reported last year that something over 6,000 acres of land would be required, and it estimated the probable cost at about \$130,000. It also stated that the 4,000 acres on Cold River and Manning Brook would be desirable for forestry purposes and could ultimately be made nearly self-supporting.

There are many precedents for such a State reservation, notably Mount Wachusett, Mount Everett, Mount Tom, the Greylock Reservations, etc., to say nothing of the metropolitan parks around the city of Boston.

It might be fair to put a portion, at least, of the expense incurred upon the counties of Berkshire and Franklin, in which the reservation will be situated, and possibly the city of North Adams would be willing to aid by making a park upon the western slope.

The Mohawk Trail has been used and enjoyed by thousands of tourists from all over this country. It is reported that over 2,500 automobiles passed over it in one day this year, and that 1,000 cars a day are common.

It is for the Legislature to decide whether the magnificent views and scenery should not be secured and preserved for all time intact and free from disfigurement, especially as the land can be secured at the present time for a relatively small amount of money.

The Commission renews the recommendation that it made in 1914 that the necessary land should be purchased or taken for the purpose of establishing a "Mohawk Trail Reservation" and thus preserving the magnificent scenery, free from disfigurement, and of preventing at the same time the costly landslides which would be certain to follow the cutting down of the forest on the mountain sides.

THE POORER TOWNS SHOULD BE AIDED AND A MUCH MORE UNIFORM SYSTEM OF MAINTENANCE SECURED ON THE TOWN HIGHWAYS.

If Massachusetts is to secure better roads and reasonably passable highways in the poorer towns, it is evident, to every one who has studied the subject even superficially, that some better methods for the constant maintenance of the country roads must be adopted.

The poorer towns cannot possibly afford to spend the money that is absolutely necessary to keep even their main roads reasonably shaped and constantly repaired.

There is no uniform system, there is no uniform maintenance in these towns. Frequently there is no one in the town who knows how to spend to advantage the money that is appropriated for the roads.

The question is, what methods can be devised that will secure the best results with the least expenditure of money? The answer is, constant maintenance and repair of the town highways.

In order to secure the best expenditure of the money there must be some competent person in charge, some one to give advice and to see that the work is properly done and done when it will produce the best results.

The Special Commission on Codifying and Revising the Highway Laws gave very careful consideration to this subject. Every member agreed that the poorer towns needed not only aid but advice and supervision by some experienced and competent road builder.

It seemed, on the whole, that this Commission, already having an organization and having engineers who were working in and were familiar with practically every portion of the State, would be the proper Board to undertake this tremendous task.

New York's new highway law provides for State aid on town highways outside the limits of the incorporated villages. These incorporated villages would correspond with a fire district or water district in our towns, being practically the thickly settled part of the township.

In New York the State gives up to \$25 a mile a year toward the improvement of these country roads in the poorer towns, the amount that the towns must appropriate to be spent with the money given by the State for the maintenance of these country roads being graded according to the valuation per mile of road in the town outside of the incorporated village.

In towns whose valuation per mile of such road is less than \$5,000, the State gives an amount per mile equal to the amount per mile that the town raised for these roads. The towns are graded on this basis, so that the richer towns have to appropriate twice as much per mile as the State allows them, in order to secure the aid.

This law seems to be working extremely well, and we are informed that in a few years it will result in a tremendous improvement of the worst pieces of the more important roads.

In Vermont the highway commission has worked out a most excellent system for the constant shaping and maintenance of the main routes, the towns being required to appropriate a certain part of the necessary money, graded according to each town's ability to pay, and the State providing the remainder. These roads are kept constantly maintained and shaped with a log drag or road machine, and more gravel is added where necessary. The work is done by maintenance men, each in charge of a certain number of miles of road. Any money that remains is expended in constructing as much new road as possible on these main lines.

New Hampshire also has a most excellent system of patrol maintenance on the main routes.

Maine has made a good beginning.

Massachusetts has such a system of maintenance on all its 1,100 miles of State highway and on a few other main routes where the Commission is expending the motor vehicle fees in keeping the highway in repair; for instance, the Newburyport Turnpike. But there is no such system in most of the towns. There certainly should be, because many towns in which a good highway has been built let it go to pieces in a year or two because of lack of proper maintenance. This is very often true even when the State or the county have co-operated in improving the road.

A few dollars, or hundreds of dollars, properly spent each year in maintaining the roads would prevent the destruction of miles of improved highway that cost a good many thousands of dollars a mile to construct.

The Poorer Towns must be aided.

A few figures will show that there are a large number of towns in this Commonwealth that cannot possibly afford to maintain their own roads without aid from some source.

There are 8 towns with a valuation of \$200,000 or less, and there are 248 miles of road in these towns.

There are 49 towns with a valuation of \$500,000 or less, and there are over 2,000 miles of highway in these towns.

There are 99 towns with a valuation of \$1,000,000 or less, and there are over 5,000 miles of highway in these towns.

There are 70 towns whose valuation is more than \$1,000,000, but less than \$2,000,000, and there are more than 3,800 miles of highway in these 70 towns.

There are 38 towns whose valuation is more than \$2,000,000, but less than \$3,000,000, and there are more than 2,200 miles of road in these 38 towns.

The total valuation of all the 99 towns with a valuation of \$1,000,000 or less is a little more than \$53,000,000, and they contain about 5,152 miles of highway, an average valuation per mile of highway of \$10,360. A tax rate of \$3 on each \$1,000 of valuation expended for the highways would give them about

\$31 a mile a year. Very many of them would get much less.

The total valuation of all the 70 towns whose valuation is between \$1,000,000 and \$2,000,000 is about \$103,500,000, and they contain about 3,880 miles of highway, an average valuation of about \$26,600 a mile. In these towns a tax rate of \$3 on each \$1,000 would produce less than \$80 a mile a year for each mile of highway.

The 38 towns whose valuation is between \$2,000,000 and \$3,000,000 have a valuation of about \$88,000,000, and they contain over 2,200 miles of highway, giving an average valuation per mile of a little less than \$40,000. A \$3 tax rate would produce about \$120 a mile in these towns.

Taking all the 207 towns whose valuation is \$3,000,000 or less, they contain more than 6,100 miles of highway, and have an average valuation of less than \$22,000 a mile for each mile of highway. If all these towns put \$3 on the tax rate and expended it on these highways, they would only secure \$66 a mile a year.

These towns contain more than one-quarter of all the highways in the Commonwealth, and yet their valuation is less than one-twentieth of the valuation of the Commonwealth.

There are more than 23,000 miles of highway in the Commonwealth and a total valuation of over \$5,000,000,000; the average valuation per mile of highway is more than \$230,000 a mile. A \$3 tax rate raised and expended on the highways would produce \$690 a mile a year in a town having the average wealth of the State, or ten times as much per mile as would be produced in these 207 towns by the same tax rate.

The Commission believes that the Commonwealth can well afford to help the poorer towns in maintaining their highways. It certainly must do so if our country roads are to be improved.

If any aid is given by the Commonwealth it would be expended under the direction and supervision of some competent Board, and any act should also provide that the towns, in order to secure aid from the State, should have to make available an equitable amount of money from their own funds to be used with the money provided by the State.

The Commission and its engineers have for the past three years, at least, been working in more than 220 of the towns

and cities each year. It believes that it would be possible for its engineers to direct and supervise the work of maintaining the roads in the poorer towns, because they have already been working in most, if not in all, of these towns and are quite familiar with local conditions, and, in many cases, know the town officials. The commissioners themselves are, or at least one commissioner is, quite familiar with practically every town in the Commonwealth, and know some of the town officials in substantially every town. This has been a necessary part of their work.

The State can afford to aid the Poorer Towns.

The Commission believes that the State can well afford to aid the poorer towns in maintaining their roads, and that such State aid will not only greatly benefit the towns, but it will be of the greatest possible benefit to all the people of the Commonwealth.

Last year the Legislature made available \$415,000 for the maintenance and improvement of the State highways, but the counties, under the law, repay 25 per cent. of this, and over \$106,000 is assessed on the counties and repaid by them to the treasury.

Furthermore, the law provides that the cities and towns shall repay to the State a part of the cost of maintaining the State highways in their municipality, graded according to their means. In 1915 more than \$174,500 was assessed upon the cities and towns.

Two hundred and eighty thousand dollars out of the \$415,000 made available by the Legislature was paid back into the treasury and was available for this work under the express provisions of law. Consequently the Commonwealth is in reality appropriating net, to be taken from the State's revenue, only about \$125,000 a year for the maintenance, resurfacing and widening of State highways.

The motor vehicle fees available for the maintenance of State highways amount to over \$1,100,000 this year, and more than \$250,000 from the motor vehicle fees is also available and is expended on the improvement of main routes in the towns.

The counties contributed more than \$117,000 this year for such improvements, and the towns themselves appropriated over \$390,000 this year for the same purpose, making over

\$400,000 that the towns and counties contributed for improving these town roads. There was \$250,000 more available from the money paid by the motor vehicle owners that was also spent on these roads, making \$650,000.

Shouldn't the Commonwealth do its share? The Commission believes it should. It believes that the State can afford and should appropriate say \$50 a mile a year to be expended in the poorer towns, under the supervision of the Commission and its engineers, in shaping with a log drag or otherwise, repairing, widening, draining, and constantly maintaining such of the country roads as are most used in these towns. The roads to be maintained could be agreed upon between the selectmen and the Commission. The mileage should not, of course, include the State highways.

This money should only be made available in the poorer towns. The Commission would suggest that towns with a valuation of \$3,000,000 or less might be included. Only such towns should be aided as really cannot afford to appropriate enough money to take care of their own roads, not those towns that can afford to but do not.

The Commission would suggest that no town be eligible to receive this aid whose valuation exceeded \$50,000 a mile for each mile of public highway in the town after the State highways therein were deducted. This valuation per mile is less than one-quarter of the average valuation per mile of highway in the Commonwealth.

Some towns with extremely small valuations would receive no aid because they have so few miles to maintain; other towns with fairly large valuations might be aided because they had so many miles of road to maintain.

Towns should make Reasonable Appropriations to secure State Aid.

In order to secure any aid from the State the town itself should be required to appropriate some reasonable amount of money for highway purposes, to be used with this \$50 a mile a year that the State had made available.

The Commission would suggest that about \$3 on each \$1,000 of valuation, to be used for highway purposes, would perhaps be about fair. This would induce the towns to make reasonable appropriations for highways.

The average amount appropriated for such purposes in the State is about \$2.20 on \$1,000. Many of the smaller, poorer towns appropriate now more than the \$3 suggested, and many of them appropriate \$5 or more on the tax rate. One town appropriated \$9 on the tax rate one year to secure the improvement of one of its highways.

The amount each town should appropriate to be used with the money provided by the State should be graded, so that the very poorest towns could afford to co-operate. The Commission would suggest a grading according to the valuation of each town per mile of highway that it had to maintain (excluding State highways), and requiring each town to appropriate substantially \$3 on each \$1,000 of valuation each year for highway purposes, to be expended with the money provided by the State in improving and maintaining all their most used highways.

This would require the poorest towns to appropriate only \$12.50 a mile a year to secure the \$50 a mile from the State, and would require the richest town that was eligible to appropriate \$125 a mile to secure State aid.

The Commission believes that the passage of an act to accomplish the above purposes would do more to secure improved highways in this Commonwealth within a few years than can be secured in any other way. It would not, of course, enable highways to be constructed that could stand all kinds of traffic at all seasons of the year, but it would provide for the constant maintenance of many miles of road in our poorer towns, and keep their country roads in good serviceable condition as dirt roads all through the season. Such constant maintenance in the poorer towns would soon force their richer neighbors to improve their roads and to maintain them as well.

SIGNS AND OTHER STRUCTURES THAT ENDANGER THE PUBLIC USING THE HIGHWAYS BY OBSCURING THE VIEW SHOULD BE REMOVED.

The tremendous increase in the traffic of motor vehicles during the last few years, and the high speed at which they are operated, has rapidly created dangerous conditions, espe-

cially on our highways in the country districts. Thousands of vehicles now pass over a highway every day, where a few years ago only twenty or thirty vehicles used it.

The highways are too narrow for the traffic, and the corners and curves are especially dangerous and should be widened and improved, and all persons should be prevented by law from making existing conditions any worse than they now are by erecting any new structures obscuring the view on such corners or curves in the country districts.

The public authorities in charge of the highways should be authorized to remove, or cause to be removed, any structures or objects that endanger the public using the highways.

Advertisers who secure special benefits from the use of improved highways by the public should pay a portion of the yearly expense of maintaining such highways.

The Commonwealth, the counties and the towns are now spending large sums of money annually in constructing and improving the highways in the country districts. This Commission has had expended under its direction about \$3,000,000 a year for the last two years, and will spend more next year if conditions are favorable. The counties are co-operating, appropriating last year over \$100,000, and the towns appropriated over \$390,000 to help improve these town roads. The Commonwealth annually appropriates \$150,000 to be used on "small town" roads, and there is \$250,000 more available from the motor vehicle fees fund for use on these roads.

The Commonwealth is spending about \$750,000 a year in constructing State highways, and is, or will be, expending nearly as much under the provisions of special acts of the Legislature.

All these roads have to be maintained. The State highways alone will cost well over \$1,250,000 a year if they are to be adequately maintained, and the older, narrow, worn-out highways are to be widened and resurfaced. All the improved highways which are being constructed will have to be maintained at a large expense.

The motor vehicle owners who use these highways are paying about \$1,250,000 a year, which will be expended in maintaining and improving these highways.

The taxpayers in all the cities and towns are all paying toward the construction and maintenance of all public ways, but there is one class in the community that receives special benefits from these improved highways but does not as yet pay any part of the cost of their maintenance. As soon as the highway is improved on any through route in the country districts, the advertisers begin to erect advertising signs, to be read by the users of the highway, thereby hoping to increase their trade and profits.

Land which, before the highway was improved, was practically valueless for any purpose, and, at the best, was only brush land, woodland or pasture land, is being rapidly occupied, especially on the through routes, which are largely used because of their natural scenery and beauty, by large structures on which are displayed advertising signs. The persons whose goods are advertised, or their agents probably in most instances, secure permission from the owner of the land to erect the sign and pay him for it, but the Commission thinks that these advertisers and the landowners near the improved highway derive a special benefit from the construction and maintenance of the road, and should pay an equitable amount toward the necessary yearly cost of repairing and maintaining it in such condition that it will continue to be used.

It is the improved highway alone which causes people to travel over the road. It is the people passing over the improved highway who read the advertisement and thereby give it any value.

The advertiser and the landowner who allows the sign to be displayed certainly receive a special benefit from the maintenance of the improved highway, and they should therefore, in common with the other taxpayers and users of the highway, pay some equitable and reasonable part of the money that has to be expended in maintaining the road.

MOTOR VEHICLE COMMISSIONER.

The number of motor vehicles and the number of operators has increased so rapidly during the last few years that already a very large proportion of the time of the commissioners each week is taken in conducting hearings on the question of the suspension or revocation of licenses to operate motor vehicles.

During the last two years these hearings have been assigned one-half hour each on Wednesdays, and have occupied the whole day, and often during the past year these hearings have had to be assigned on other days of the week. Many times it has been necessary to have the individual commissioners hold separate hearings at the same time, in order to finish the cases which had been assigned for that day.

In addition to this the accidents in which motor vehicles are involved have naturally increased, with the increased number of motor vehicles and motor cycles registered.

In 1909 only 26,375 automobiles and motor cycles were registered, and there were only 491 registered dealers.

In 1916 (to November 30) 147,522 automobiles and motor cycles had been registered, and there were 1,977 registered dealers, each having at least 5 sets of number plates and some of them having 75 sets of number plates.

The number of automobiles and motor cycles has increased $5\frac{1}{2}$ times, and the number of dealers has increased 4 times in the last seven years.

In 1909 there were only 18,251 licensed operators, and in 1916 there were 171,596 licensed operators. The number of licensed operators increased over 9 times in the seven years.

In 1909, 3,473 persons were examined; in 1916 there were 12,386 persons examined.

The Commission is required by law to investigate all fatal accidents in which motor vehicles are involved, and as far as possible it has investigations made of the more serious accidents where it seems at all probable from the report that the operator was either incompetent or was operating improperly, or was not in proper condition to operate a motor vehicle. These investigations are made by the investigators of the investigating and examining department.

In 1909, as at the present time, Mr. F. L. Austin, chief examiner and investigator, was in charge of that work. He had at that time three assistants. One more was added during the year, making five examiners and investigators.

In certain parts of the State the examiners also investigate accidents occurring in the territory to which they are assigned.

In 1909 they investigated 241 cases and prosecuted 33 operators in the courts.

In 1916 the same chief examiner had sixteen investigators and examiners, and they investigated and made reports in 1,470 cases and prosecuted 78 operators in the courts.

In 1909 there were 54 fatal accidents reported on, and in 1916 there were 301.

The reports of the investigators are made in the form of a typewritten report, usually with a diagram showing the highways, course of motor vehicle, etc., and giving a full statement from the operators and witnesses.

In all fatal accidents the law requires the suspension of the license of the operator of the motor vehicle involved, requires an investigation to be made, and the license to be revoked unless the Board finds that the operator was without "serious fault."

The Board, therefore, has to read all these reports, two members of the Board at least reading them, and then has to decide, not only in the fatal accidents but in the other serious accidents reported on, whether the operator was at fault or was an improper person to hold a license, etc., and to take action thereon by suspending or revoking the license.

In all cases, before the license is revoked, the operator is notified and a time set for a hearing, and hearings are always given when a license is suspended if a request is made for a hearing.

The careful reading of these reports that is necessary to enable the Commission to act on them intelligently and with fairness to all concerned has become a tremendous task. The Commission often has to read and act upon thirty or more investigators' reports in one week. A report is almost invariably five or six typewritten pages, and very often ten, twelve or more pages in length. All this involves a very large amount of time and attention that really should be given to the many questions that relate to the highway department.

In 1909 the Commission held 155 hearings in automobile cases; in 1916 it held 475 such hearings.

The increase in the work of the examining and investigating department since it was authorized by the Legislature in 1908 is well shown in the following table:—

YEAR.	Autos reg- istered. ¹	Motor Cycles reg- istered.	Number of Persons killed.	Number of Persons injured.	Licenses sus- pended.	Licenses revoked.	Rights sus- pended.
1908, . . .	18,052	1,917	13 ²	486 ²	51	44	-
1909, . . .	23,971	2,394	54	989	132	68	-
1910, . . .	31,360	3,370	77	963	198	90	-
1911, . . .	38,907	3,658	110	1,248	254	95	-
1912, . . .	50,132	5,034	142	1,962	325	190	-
1913, . . .	62,660	7,127	188	2,923	365	198	-
1914, . . .	77,246	8,161	229	4,010	521	231	34
1915, . . .	102,633	9,520	294	6,197	615	303	181
1916, . . .	136,809	10,713	315	9,131	641	514	232
	541,770	51,894	1,422	27,909	3,102	1,733	447

¹ Includes trucks and commercial vehicles.

² From July, 1908, to Dec. 1, 1908.

The Commission feels that the work of examining operators and investigating accidents, and acting upon the reports of the investigators, as well as the holding and conducting of the necessary hearings in these motor vehicle cases, has become so important that it warrants the appointment of a motor vehicle commissioner, who could be authorized to perform all the duties now imposed by law upon the Commission relating to the examination of operators, the investigation of accidents in which motor vehicles are involved, and all other investigations as to the conduct or competence and fitness of the operators of motor vehicles, dealers, garage records, etc.

The Commission also feels that such a motor vehicle commissioner could be authorized to do any and all acts which the Commission is by law now authorized to do relating to the suspension or revocation of licenses to operate motor vehicles, the suspension or revocation of the registration of motor vehicles and motor cycles, as well as the renewal or reissuing of new licenses upon probation or otherwise, and the suspension of the right of any unlicensed person to operate a motor vehicle on the highways of this Commonwealth until licensed to do so.

The salary necessary to secure the services of a competent person could be paid from the motor vehicle fees fund, and could be determined by the Commission.

The appointment of a motor vehicle commissioner by the Commission from time to time, and the terms on which he was to be employed, as well as the amount of salary or compensation which he was to receive, should be subject to the approval of the Governor and Council.

In this connection it should be remembered that the work of the highway department has increased many fold during these seven years, and that this work is of sufficient importance to require the whole time of the commissioners.

In 1908, when the duty of investigating fatal accidents was placed upon the Commission, there were only 740 miles of State highway, and there was only \$500,000 a year available for the construction of State highways and "small town" roads. At that time only 164 miles of road had been improved under the "small town" act. Work was being done in only two places in the Commonwealth under authority of special acts.

The Commission that year had available only \$235,433 for the maintenance of State highways. Only a very few miles of road had been even coated with oil or tar. During that year surveys and preliminary estimates, etc., were made in 34 towns, covering 45 miles of road. Thirty-four miles of State highway were constructed, and about 8 miles more were under construction.

In 1916, and for the last three years, \$1,000,000 a year has been available for the construction of State highways and "small town" roads. About \$1,000,000 more has been available for the maintenance, resurfacing, widening and reconstruction of the old State highways.

Practically every mile of State highway and very many miles of town road have been coated with some bituminous product.

There are now 1,155 miles of State highway, and 790 miles of road have been improved under the "small town" act or with motor vehicle fees.

The Commission has over \$200,000 more, this being 20 per cent. of the net motor vehicle fees, available for constructing or improving the through routes or main highways in the towns.

Work was going on, or contracts were let, for work in more than 200 different cities and towns.

The cities and towns themselves were appropriating yearly as much of their own money as the Commission had available for construction eight years ago, to be either spent under the direction of the Commission or to be expended by the Commission in improving roads, together with money allotted by the Commission for such improvement.

In 1916 the counties made appropriations amounting to over \$100,000, the towns appropriated \$134,000, and the Commission allotted over \$191,000 from the motor vehicle fees fund, making over \$362,000 available for the improvement of highways in 54 different towns, each paying approximately one-third of the cost, while eight years ago practically the only money received from the towns was \$25,000 a year in towns of over \$1,000,000 valuation under the "small town" act.

In addition to this, in order to secure the \$50,000 a year that is available under the "small town" act in towns of under \$1,000,000 valuation, under the "contributing clause," the towns themselves have to appropriate \$50,000 yearly. The law making a fund available for this purpose was enacted in 1908, though the amount was only \$25,000 a year.

In 1915 the Legislature authorized the Commission to expend \$2,000,000 in constructing or improving 17 different routes in the 5 western counties in 38 towns and 1 city, and in addition to this expenditure the counties were to repay one-quarter, or \$500,000, to be expended by the Commission either on these routes or on the main roads in the poorer towns in those counties.

In 1916 the Legislature passed fourteen special acts, appropriating \$513,000 to be expended by the Commission in improving the highways therein specified. All of these highways require careful surveys and studies.

The Commission is now expending about \$3,000,000 a year, and if labor conditions had been normal it would have expended about \$4,000,000 this year, instead of about \$700,000 that was available eight years ago.

In 1915 over 180 miles of road were constructed from the various funds which were available, and in 1916 over 138 miles were constructed. Construction work was going on in over 200 different places under different acts.

The number of miles of road and the number of different cities and towns and places where work is to be done, each requiring special study and attention, really more nearly represent the increase in the work and the time and attention required from the commissioners themselves than does the actual increase in the amount of money expended. Each town, each road, each contract requires and should have some attention from one of the commissioners at least. In many cases the judgment of all is required.

From the above recital of facts the Legislature can clearly see that it would be wise to authorize the Commission to appoint a "motor vehicle commissioner," who could give all his time, if necessary, to the matters relating to motor vehicles and the operation thereof, and thus relieve the Commission of a large amount of work requiring many hours every week which could then be devoted to the many questions relating to highway construction and maintenance which require and should have more of their time, attention and knowledge.

REGULATION OF TRAFFIC.

Quite a few accidents have occurred this year, and a great number of near accidents, because of the uncertainty as to who has the right of way when two vehicles meet on the road and both vehicles are complying with the law, but one vehicle is passing another vehicle or obstruction in the highway, and, in order to pass, has to turn on to its own left-hand side of the road.

The Commission believes it would be desirable to make the situation absolutely clear and to add a new section to the law of the road stating that when two vehicles are meeting on any highway or bridge, the vehicle which is on its own right-hand side of the middle of the traveled part of the way in the direction in which it is going shall have the right of way, and when it is necessary for the public safety that one of two vehicles shall slow down or stop, the vehicle which in order to proceed has to go upon its own left-hand side of the middle of the traveled part of the way shall slow down or stop, so that the vehicle on its own right shall have the right of way.

REGULATION OF THE OPERATORS OF MOTOR VEHICLES.

This subject is one which the Commission has had to study constantly since the comprehensive motor vehicle act was passed in 1909, granting to this Commission the authority to issue licenses to operators of motor vehicles, and requiring it in certain cases, and authorizing it in others, to suspend or revoke the licenses of the operators.

It has been a tremendous task, as well as a serious responsibility, to attempt to safeguard the public, and, at the same time, do no injustice to any one.

The Legislature in 1916, by chapter 290, General Acts, amended the motor vehicle law in several respects, taking away from the Commission, in certain cases that were passed upon by the courts, the authority to restore a license pending an appeal to a jury, and requiring the immediate revocation of the license "unless the court or magistrate recommends otherwise." It was also provided that no new license could be issued within certain specified periods of time.

The Commission believes that this statute, as it is now being enforced, is not always accomplishing the results which the Legislature intended.

The Commission will go as far as any one, and has always attempted, to the best of its ability, to remove the drunken, reckless or incompetent operator from the highway. It believes, however, that the term "whoever . . . operates . . . while under the influence of intoxicating liquor" is too indefinite. It is susceptible of different interpretations in different courts. In one court any man who has had one drink, within any reasonable number of hours, is held by the judge to be guilty of operating "under the influence of liquor;" while in another court some other interpretation will be given.

None of the judges with whom the Commission has consulted thinks that these words accomplish the purpose intended, to wit, to take the drunken operator off the road.

The Commission believes it would more nearly accomplish what the Legislature intended if some other words were used, *e.g.*, "whoever operates a motor vehicle while in a drunken condition or when he is incapable of operating with safety to himself and the public because of his having taken any intoxi-

cating liquor." This would leave it to the court to decide whether the operator was in a fit condition to operate a motor car properly. Some tribunal should pass upon this question, either the court or this Commission.

The drunken operator should not be tolerated upon the road, but a person should not be deprived of his right to operate a motor vehicle merely because he is unwise or hot-headed enough to provoke an officer who stops him for some other reason than because of anything that would indicate that the operator had been drinking.

The law passed last year requires the Commission to revoke the license immediately upon the receipt of the record. It also provides, as an exception, however, "unless the court or magistrate recommends otherwise." In quite a few cases this year the judge has been requested to make such a recommendation after the first trial, and has made a careful investigation and heard evidence, and has then decided, after full knowledge of the conditions, that he will make such a recommendation. The Commission meantime has already revoked the license upon receipt of the court record. Clearly, in the interests of justice it should be returned. The Attorney-General, after serious doubt, has expressed the opinion that the Commission had power to rescind its action revoking the license. The law should be amended so as to prevent such a question from arising.

The Attorney-General in his opinion calls attention to the fact that as last year's statute expressly provides further along in the section "that no new license shall be issued by the Commission to any person convicted of operating a motor vehicle while under the influence of intoxicating liquor until one year after the date of final conviction," etc., that it may be held that a new license includes the renewal of the old license when it expires, and that, consequently, while the Commission may, acting upon the recommendation of the trial judge, refrain from revoking an existing license, that when that license expires it may not have the right to renew it.

The Legislature evidently did not intend to create any such condition, and the Commission therefore recommends that the law be amended to cover the above points and so as to make it clear and equitable.

WHENEVER ANY PERSON IS KILLED OR INJURED IN ANY ACCIDENT REPORT SHOULD BE MADE TO THE MASSACHUSETTS HIGHWAY COMMISSION.

Every operator of a motor vehicle is now required to make a report to the Commission whenever said vehicle is involved in an accident in which any person or property is injured.

This law has resulted in the Commission's receiving a tremendous number of such reports each year. Year by year, with the increasing number of motor vehicles, the number of such reports increases.

This year more than 16,000 such reports were received. They all had to be read, acknowledged and filed at least. Our chief examiner and investigator, who has charge of that department, reports that from 85 to 90 per cent. of these reports related to accidents of a very trivial nature.

The wording of the law is such that the Commission is constantly being asked what constitutes an injury to a person or property. Is a hen property? Is a bruised finger, a scratched hand, an injury to a person? Is a broken headlight or bent mudguard injury to property, and should reports be made? Is a motor vehicle involved in an accident if you are putting on a tire and you hit your hand with a hammer? Should you report that you had broken your arm or leg because the motor backfired when you were cranking?

Countless such questions arise, and the Commission believes the purposes of the act would be better accomplished if reports were to be made only in case of accidents in which any one was killed or where any person was severely or seriously injured. This would result not only in preventing reports of trivial accidents from being made, but would also allow more attention to be given to the reports which were received by some one who was familiar with the operation of motor vehicles, and in consequence it is probable that more cases would be selected for investigation.

The Commission has now divided the State into districts, and assigned one investigator to each district, so that it is probable that each investigator will hear of all serious accidents that should be investigated from the police or city or town authorities, or from the press.

The Commission believes that better results will be obtained if the reports required of accidents in which motor vehicles are involved are limited to the more serious accidents, and it therefore recommends that the present law be amended.

THE COMMISSION SHOULD BE AUTHORIZED TO DESTROY CERTAIN RECORDS, PAPERS AND LETTERS WHICH HAVE BECOME OBSOLETE AND ARE OF LITTLE OR NO VALUE, AFTER A CERTAIN PERIOD OF TIME.

There are now in our files many thousands of old court records of convictions of minor offences. There is no room to keep them among the live files, and they are practically of no value; still they have to be stored unless the Commission is authorized to destroy them from time to time. They are at present stored in the basement of a building hired by the Commonwealth outside of the State House.

Since chapter 530 of the Acts of 1913 went into effect, requiring a report to be made to the Commission when any motor vehicle was involved in any accident in which any person or property was injured, a great many letters have been received each year.

Many thousands of them have had to be read, acknowledged, filed, and, after a year, they have to be stored outside of the office. They are seldom or never referred to, and naturally it takes a great deal of time to look them up and find them if they are desired after two years.

The Commission believes it should be authorized to destroy such worthless records, reports, letters and papers after they have ceased to be of value. The court records could be kept for the current year and for the two preceding years, the reports of accidents and other papers for the current year and the preceding year.

The Commission recommends that it be given authority to destroy such records, papers, letters, etc., after they have become worthless.

EXPENDITURES.

The following is a summary of the expenditures of the Massachusetts Highway Commission from Dec. 1, 1915, to Nov. 30, 1916:—

CONSTRUCTION EXPENDITURES.

TOWN OR CITY.	Amount.	Totals.
<i>Barnstable County.</i>		
Barnstable,	\$21,386 02	\$43,492 83
Chatham,	6 40	
Eastham,	767 46	
Mashpee,	71 20	
Provincetown,	4,651 27	
Truro,	8,285 94	
Wellfleet,	8,324 54	
<i>Berkshire County.</i>		
Cheshire,	\$18 00	33,515 17
Clarksburg,	3,411 96	
Egremont,	1,411 82	
Florida,	226 86	
Great Barrington,	8,663 18	
Hancock,	12 92	
Hinsdale,	7 30	
Lee,	10,721 71	
Lenox,	22 17	
North Adams,	133 06	
Pittsfield,	68 35	
Sheffield,	8,747 71	
Williamstown,	38 10	
Windsor,	32 03	
<i>Bristol County.</i>		
Dartmouth,	\$42 50	16,918 29
Dighton,	30 70	
Norton,	15,465 34	
Somerset,	1,356 65	
Swansea,	13 29	
Taunton,	9 81	
<i>Dukes County.</i>		
Chilmark,	\$0 32	64
Gay Head,	32	
<i>Essex County.</i>		
Danvers,	\$3,672 91	
Gloucester,	43,182 58	
Amounts carried forward,	\$46,855 49	\$93,926 93

CONSTRUCTION EXPENDITURES — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i>	\$46,855 49	\$93,926 93
Hamilton,	7,412 00	
Ipswich,	1 30	
Lawrence,	4,152 57	
Lynn,	9,884 72	
Methuen,	25,112 35	
Middleton,	4,822 00	
Newbury,	6 40	
North Andover,	29,654 91	
Rowley,	44 29	
Salem,	974 29	
Salisbury,	8,535 61	
<i>Franklin County.</i>		137,455 93
Bernardston,	\$27 28	
Buckland,	49 30	
Charlemont,	41,528 86	
Deerfield,	29 94	
Erving,	122 36	
Montague,	8 96	
Northfield,	46 00	
Orange,	70 16	
Shelburne,	706 15	
Sunderland,	10 83	
Whately,	19 83	
<i>Hampden County.</i>		42,619 67
Monson,	\$2 00	
Palmer,	216 46	
Wilbraham,	44 70	
<i>Hampshire County.</i>		263 16
Amherst,	\$5,370 75	
Granby,	15,045 14	
Hadley,	34 21	
Hatfield,	24 27	
Northampton,	18,200 60	
South Hadley,	3,906 53	
<i>Middlesex County.</i>		42,581 50
Arlington,	\$2,310 17	
Ashby,	4 44	
Ayer,	177 98	
Chelmsford,	11,249 31	
Groton,	40 28	
Lexington,	585 95	
Littleton,	430 70	
<i>Amounts carried forward,</i>	\$14,798 83	\$316,847 19

CONSTRUCTION EXPENDITURES — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i>	\$14,798 83	\$316,847 19
Lowell,	5 50	
Marlborough,	9,811 07	
Pepperell,	609 25	
Reading,	514 97	
Shirley,	3,797 70	
Somerville,	35 80	
Stoneham,	3 00	
Tewksbury,	108 80	
Townsend,	27 36	
Tyngsborough,	17 60	
Wayland,	1 86	
Woburn,	7,448 92	
<i>Norfolk County.</i>		37,180 66
Avon,	\$2 41	
Braintree,	7,093 92	
Dedham,	6,160 37	
Randolph,	4,034 34	
Stoughton,	359 52	
Walpole,	3,872 81	
Weymouth,	13,775 47	
Wrentham,	5,357 32	
<i>Plymouth County.</i>		40,656 16
Abington,	\$1,354 84	
Bridgewater,	105 88	
Duxbury,	4,054 35	
East Bridgewater,	3,551 70	
Hanover,	42 52	
Hingham,	1,256 12	
Kingston,	32 07	
Middleborough,	87 31	
Pembroke,	3,754 63	
Plymouth,	17,392 81	
West Bridgewater,	6 00	
Whitman,	1,027 90	
<i>Worcester County.</i>		32,666 13
Ashburnham,	\$716 36	
Athol,	28 35	
Barre,	78 06	
Charlton,	510 12	
Dudley,	13,587 68	
Fitchburg,	30 44	
Gardner,	44 46	
Grafton,	6,875 64	
<i>Amounts carried forward,</i>	\$21,871 11	\$427,350 14

CONSTRUCTION EXPENDITURES — *Concluded.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$21,871 11	\$427,350 14
Holden,	4,657 29	
Leicester,	1 50	
Leominster,	2,533 85	
Lunenburg,	40 29	
Northbridge,	19,915 44	
Oxford,	1,425 66	
Paxton,	135 37	
Phillipston,	20 40	
Southbridge,	66 78	
Spencer,	13 50	
Sturbridge,	189 93	
Templeton,	50 43	
Uxbridge,	11,010 18	
West Boylston,	4,414 68	
Westminster,	415 54	
Winchendon,	605 61	
		67,367 56
		\$494,717 70

EXPENDITURES UNDER "SMALL TOWN" ACTS.

[Chapter 47, Revised Laws, and Chapter 279, Acts of 1908.]

<i>Barnstable County.</i>		
Eastham,	\$639 49	\$639 49
<i>Berkshire County.</i>		
Becket,	\$797 27	
Clarksburg,	80 00	
Egremont,	715 36	
Florida,	1,388 08	
Hancock,	717 80	
Hinsdale,	420 00	
Lanesborough,	343 68	
Monterey,	794 22	
Mount Washington,	555 43	
New Marlborough,	1,594 31	
Otis,	804 00	
Richmond,	53 55	
Sandisfield,	1,063 28	
Savoy,	671 64	
Tyringham,	20 16	
West Stockbridge,	98 80	
		10,117 58
<i>Amount carried forward,</i>		\$10,757 07

EXPENDITURES UNDER "SMALL TOWN" ACTS — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amount brought forward, . . .</i>	<i>. . .</i>	\$10,757 07
<i>Bristol County.</i>		
Berkley,	\$1,500 00	
Rehoboth,	503 16	
Westport,	300 00	2,303 16
<i>Essex County.</i>		
Boxford,	\$450 00	450 00
<i>Franklin County.</i>		
Ashfield,	\$478 98	
Charlemont,	329 96	
Colrain,	2,600 00	
Hawley,	700 00	
Heath,	580 09	
Leyden,	600 00	
Monroe,	500 00	
New Salem,	1,637 13	
Rowe,	825 74	
Shelburne,	2,500 00	
Warwick,	700 00	
Wendell,	1,678 00	13,129 90
<i>Hampden County.</i>		
Brimfield,	\$2,688 35	
Chester,	1,030 43	
Granville,	1,073 62	
Hampden,	550 17	
Holland,	800 00	
Ludlow,	5 00	
Montgomery,	377 10	
Southwick,	2,060 44	
Tolland,	1,633 04	
Wilbraham,	2,991 25	13,209 40
<i>Hampshire County.</i>		
Belchertown,	\$940 00	
Chesterfield,	2,027 98	
Greenwich,	280 00	
Hadley,	50 00	
Huntington,	983 81	
Middlefield,	427 30	
Plainfield,	810 43	
Prescott,	640 00	
Southampton,	961 99	
Westhampton,	834 50	
Williamsburg,	1,073 01	9,029 02
<i>Amount carried forward, . . .</i>	<i>. . .</i>	\$48,878 55

EXPENDITURES UNDER "SMALL TOWN" ACTS — *Concluded.*

TOWN OR CITY.	Amount.	Totals.
<i>Amount brought forward, . . .</i>	<i>. . .</i>	\$48,878 55
<i>Middlesex County.</i>		
Boxborough,	\$700 00	
Dunstable,	25 00	
Pepperell,	632 10	
Stow,	916 67	
Townsend,	599 17	
		2,872 94
<i>Norfolk County.</i>		
Bellingham,	\$47 90	
Foxborough,	975 00	
Needham,	3,350 36	
		4,373 26
<i>Plymouth County.</i>		
Halifax,	\$3,750 00	
Hanson,	3,349 48	
Marshfield,	9 36	
Norwell,	57 72	
Plympton,	1,025 00	
		8,191 56
<i>Worcester County.</i>		
Berlin,	\$164 58	
Dana,	628 09	
Harvard,	3,000 00	
Hubbardston,	1,500 00	
North Brookfield,	1,844 91	
Oakham,	700 00	
Petersham,	598 27	
Southbridge,	2,000 00	
Spencer,	3,500 00	
Sturbridge,	1,414 33	
Templeton,	1,620 31	
West Brookfield,	1,107 38	
Westborough,	2,000 00	
		20,077 87
		\$84,394 18

EXPENDITURES UNDER CHAPTER 221, GENERAL ACTS OF 1915, FOR THE
CONSTRUCTION OF ROADS IN WESTERN MASSACHUSETTS COUNTIES.

TOWN OR CITY.	Amount.	Totals.
<i>Route No. 1.</i>		
Sheffield,	\$27,746 06	\$28,795 33
Great Barrington,	1,049 27	
<i>Route No. 2.</i>		
Cummington,	\$16,310 48	18,871 32
Goshen,	1,700 17	
Windsor,	642 40	
Dalton,	218 27	
<i>Route No. 3.</i>		
Otis,	\$1,131 48	1,818 51
Becket,	250 37	
Sandisfield,	436 66	
<i>Route No. 4.</i>		
Hinsdale,	\$351 34	10,371 24
Washington,	1,609 26	
Becket,	8,410 64	
<i>Route No. 5.</i>		
Huntington,	\$47,406 18	64,491 31
Worthington,	16,919 36	
Cummington,	165 77	
<i>Route No. 6.</i>		
Hinsdale,	\$14,855 77	16,603 92
Peru,	1,213 21	
Worthington,	523 44	
Huntington,	11 50	
<i>Route No. 7.</i>		
Plainsfield,	\$3 38	3 38
<i>Route No. 8.</i>		
Enfield,	\$11 42	34,334 55
Belchertown,	3,512 20	
Palmer,	27,853 45	
Ware,	2,957 48	
<i>Route No. 9.</i>		
Southwick,	\$4,067 38	4,286 41
Agawam,	216 25	
Granville,	2 78	
<i>Amount carried forward,</i>		
		\$179,575 97

EXPENDITURES UNDER CHAPTER 221, GENERAL ACTS OF 1915, FOR THE
CONSTRUCTION OF ROADS IN WESTERN MASSACHUSETTS COUNTIES —
Concluded.

TOWN OR CITY.	Amount.	Totals.
<i>Amount brought forward,</i> . . . . .	. . . . .	\$179,575 97
<i>Route No. 10.</i>		
Goshen,	\$9,873 90	
Ashfield,	22,733 88	
Conway,	11,736 64	
Deerfield,	9,174 39	53,518 81
<i>Route No. 11.</i>		
Gill,	\$723 09	
Northfield,	104 36	827 45
<i>Route No. 12.</i>		
Rutland,	\$11,538 60	
Oakham,	1,786 00	
Barre,	2,764 56	
Petersham,	20,540 11	36,629 27
<i>Route No. 13.</i>		
Upton,	\$16,727 03	
Grafton,	28,300 68	
Hopedale,	135 48	45,163 19
<i>Route No. 14.</i>		
Orange,	\$3,425 75	
Warwick,	709 72	4,135 47
<i>Route No. 15.</i>		
Russell,	\$38,992 56	38,992 56
<i>Route No. 16.</i>		
Wales,	\$4,299 31	4,299 31
<i>Route No. 17.</i>		
Northampton,	\$156 49	
Williamsburg,	4,230 73	
Chesterfield,	9,967 65	14,354 87
		\$377,496 90

REPAIR AND MAINTENANCE EXPENDITURES.

[Chapter 203, Special Acts of 1916.]

TOWN OR CITY.	Amount.	Totals.
<i>Barnstable County.</i>		
Barnstable,	\$9,427 59	
Bourne,	2,152 55	
Brewster,	1,783 55	
Chatham,	2,478 79	
Dennis,	9,355 65	
Eastham,	2,943 63	
Falmouth,	6,467 82	
Harwich,	1,289 71	
Mashpee,	683 04	
Orleans,	1,363 48	
Provincetown,	85 27	
Sandwich,	751 48	
Truro,	611 18	
Wellfleet,	310 64	
Yarmouth, North,	621 78	
Yarmouth, South,	1,300 96	
		\$41,627 12
<i>Berkshire County.</i>		
Adams,	\$714 52	
Becket,	3,351 50	
Cheshire,	1,720 53	
Clarksburg,	800 32	
Dalton,	519 31	
Egremont,	57 85	
Florida,	5,165 40	
Great Barrington,	901 94	
Hancock,	18,665 25	
Hinsdale,	197 94	
Lanesborough,	575 87	
Lee,	3,214 36	
Lenox,	2,785 31	
North Adams,	5,701 72	
Pittsfield,	3,446 23	
Richmond,	1,223 74	
Savoy,	838 77	
Sheffield,	1,409 26	
Stockbridge,	1,474 96	
Williamstown,	936 51	
Windsor,	105 48	
		53,806 77
<i>Bristol County.</i>		
Acushnet,	\$1,850 91	
Attleboro,	1,729 41	
Berkley,	285 57	
Dartmouth,	2,119 18	
<i>Amounts carried forward,</i>	\$5,985 07	\$95,433 89

REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$5,985 07	\$95,433 89
Dighton,	824 75	
Easton,	551 15	
Fairhaven,	117 27	
Fall River,	26 06	
Freetown,	1,065 00	
Mansfield,	378 42	
North Attleborough,	1,301 21	
Norton,	1,486 05	
Raynham,	598 08	
Rehoboth,	1,314 24	
Seekonk,	784 04	
Somerset,	1,697 46	
Swansea,	2,000 52	
Taunton,	6,931 87	
Westport,	2,452 64	
		27,513 83
<i>Dukes County.</i>		
Chilmark,	\$689 91	
Edgartown,	121 92	
Gay Head,	212 90	
Oak Bluffs,	94 39	
Tisbury,	405 24	
West Tisbury,	71 07	
		1,595 43
<i>Essex County.</i>		
Amesbury,	\$1,302 82	
Andover,	969 41	
Beverly,	2,922 20	
Danvers,	110 94	
Essex,	412 99	
Gloucester,	19,714 89	
Groveland,	943 58	
Hamilton,	1,865 58	
Haverhill,	3,041 39	
Ipswich,	3,622 67	
Lawrence,	656 47	
Lynn,	378 48	
Merrimac,	982 45	
Methuen,	2,104 30	
Middleton,	187 62	
Newbury,	1,623 97	
Newburyport,	759 32	
North Andover,	2,394 35	
Rockport,	962 67	
<i>Amounts carried forward,</i> . . .	\$44,956 10	\$124,543 15

REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$44,956 10	\$124,543 15
Rowley,	2,210 12	
Salem,	1,570 98	
Salisbury,	2,118 97	
Saugus,	1,774 67	
Swampscott,	1,708 74	
Wenham,	1,317 15	
West Newbury,	2,025 68	57,682 41
<i>Franklin County.</i>		
Ashfield,	\$282 72	
Bernardston,	1,224 35	
Buckland,	1,564 12	
Charlemont,	3,027 57	
Colrain,	771 42	
Deerfield,	2,041 62	
Erving,	2,073 09	
Greenfield,	1,240 81	
Montague,	1,061 83	
Northfield,	460 17	
Orange,	683 87	
Shelburne,	2,035 54	
Sunderland,	1,125 31	
Whately,	298 29	17,890 71
<i>Hampden County.</i>		
Agawam,	\$2,306 55	
Brimfield,	178 56	
Chester,	1,659 10	
Chicopee,	1,082 94	
East Longmeadow,	963 95	
Holyoke,	491 64	
Monson,	212 43	
Palmer,	2,846 29	
Russell,	1,929 87	
Wales,	24 11	
West Springfield,	248 23	
Westfield,	1,081 61	
Wilbraham,	1,095 45	14,120 73
<i>Hampshire County.</i>		
Amherst,	\$1,125 30	
Belchertown,	1,124 42	
Easthampton,	938 96	
<i>Amounts carried forward,</i> . . .	\$3,188 68	\$214,237 00

REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$3,188 68	\$214,237 00
Goshen,	606 50	
Granby,	1,796 31	
Hadley,	1,336 02	
Hatfield,	481 51	
Huntington,	1,075 43	
Northampton,	1,342 07	
South Hadley,	2,157 24	
Southampton,	5 98	
Ware,	1,620 94	
Williamsburg,	766 84	
		14,377 52
<i>Middlesex County.</i>		
Acton,	\$1,483 58	
Ashby,	57 50	
Ashland,	592 32	
Ayer,	712 87	
Bedford,	439 65	
Billerica,	286 73	
Boxborough,	872 91	
Burlington,	1,257 33	
Chelmsford,	2,273 89	
Concord,	2,127 29	
Dracut,	544 57	
Framingham,	2,229 81	
Groton,	526 34	
Holliston,	1,203 46	
Hudson,	366 14	
Lexington,	2,440 08	
Lincoln,	757 87	
Littleton,	930 85	
Lowell, East,	55 58	
Lowell, North,	297 51	
Lowell, South,	1,246 11	
Marlborough,	3,324 54	
Medford,	333 28	
Melrose,	213 84	
Natick,	2,789 47	
Newton,	289 20	
North Reading,	1,298 00	
Pepperell,	689 22	
Reading,	13,258 36	
Shirley,	646 30	
Somerville,	750 16	
Stoneham,	675 81	
Sudbury,	3,797 69	
<i>Amounts carried forward,</i> . . .	\$48,768 26	\$228,614 52

REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$48,768 26	\$228,614 52
Tewksbury,	2,421 41	
Townsend,	674 41	
Tyngsborough,	1,531 15	
Watertown,	1,322 26	
Wayland,	646 96	
Westford,	1,593 14	
Weston,	594 21	
Wilmington,	716 54	
Winchester,	875 05	
Woburn,	1,000 35	
		60,143 74
<i>Nantucket County.</i>		
Nantucket,	\$536 58	536 58
<i>Norfolk County.</i>		
Avon,	\$87 66	
Bellingham,	732 36	
Braintree,	610 43	
Canton,	1,195 15	
Cohasset,	1,254 42	
Dedham,	468 41	
Dover,	1,399 88	
Foxborough,	1,055 47	
Franklin,	1,623 28	
Holbrook,	622 45	
Milton,	763 82	
Needham,	970 34	
Norfolk,	627 40	
Norwood,	1,122 09	
Plainville,	173 33	
Quincy,	908 85	
Randolph,	505 27	
Sharon,	185 58	
Stoughton,	872 72	
Walpole,	1,404 68	
Wellesley,	536 74	
Westwood,	9,594 98	
Weymouth,	4,056 62	
Wrentham,	2,478 26	
		33,250 19
<i>Plymouth County.</i>		
Abington,	\$1,345 74	
Bridgewater,	651 88	
<i>Amounts carried forward,</i> . . .	\$1,997 62	\$322,545 03

REPAIR AND MAINTENANCE EXPENDITURES — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$1,997 62	\$322,545 03
Brockton,	869 66	
Duxbury,	1,171 63	
Hanover,	807 17	
Hingham,	934 91	
Kingston,	168 17	
Lakeville,	984 79	
Marion,	1,737 38	
Marshfield,	1,875 26	
Mattapoissett,	549 99	
Middleborough,	1,761 32	
Pembroke,	1,208 79	
Plymouth,	1,499 54	
Rochester,	1,643 69	
Rockland,	1,295 16	
Scituate,	1,046 08	
Wareham,	1,988 40	
West Bridgewater,	777 02	
Whitman,	480 31	
		22,796 89
<i>Suffolk County.</i>		
Boston,	\$2,840 90	
Chelsea,	951 80	
Revere, East,	693 73	
Revere, North,	400 15	
Revere, West,	535 48	
		5,422 06
<i>Worcester County.</i>		
Ashburnham,	\$2,395 87	
Athol,	471 84	
Auburn,	3,964 51	
Barre,	630 85	
Blackstone,	1,858 72	
Brookfield,	1,563 14	
Charlton,	3,857 79	
Douglas,	779 84	
Dudley,	639 64	
Fitchburg,	773 41	
Gardner,	382 80	
Grafton,	2,262 22	
Hardwick,	414 59	
Harvard,	528 45	
Holden,	1,178 98	
Lancaster,	604 31	
Leicester,	3,295 49	
<i>Amounts carried forward,</i> . . .	\$25,602 45	\$350,763 98

REPAIR AND MAINTENANCE EXPENDITURES — *Concluded.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$25,602 45	\$350,763 98
Leominster,	1,128 71	
Lunenburg,	7,317 33	
Milford,	765 23	
Millbury,	2,478 90	
New Braintree,	30 26	
North Brookfield,	814 37	
Northborough,	1,029 84	
Northbridge,	219 38	
Oxford,	776 54	
Paxton,	1,970 71	
Phillipston,	6,525 08	
Princeton,	903 91	
Rutland,	124 79	
Shrewsbury,	1,232 67	
Southborough,	943 36	
Southbridge,	243 29	
Spencer,	2,053 17	
Sterling,	1,965 73	
Sturbridge,	558 04	
Sutton,	787 48	
Templeton,	1,953 08	
Uxbridge,	930 23	
Warren,	1,137 95	
Webster,	947 90	
West Boylston,	1,689 33	
West Brookfield,	1,096 90	
Westborough,	546 82	
Westminster,	2,784 41	
Winchendon,	2,310 33	
Worcester,	2,487 80	
		73,355 99
		<u>\$424,119 97</u>

EXPENDITURES FROM MOTOR VEHICLE FEES FUND.

[Chapter 534, Acts of 1909.]

REPAIRS OF STATE HIGHWAYS.

TOWN OR CITY.	Amount.	Totals.
<i>Barnstable County.</i>		
Barnstable,	\$1,269 32	
Bourne,	9,650 33	
Brewster,	1,317 68	
Chatham,	887 61	
Dennis,	2,521 25	
Eastham,	5,180 57	
Falmouth,	12,177 04	
Harwich,	5,749 37	
Orleans,	2,403 64	
Provincetown,	104 45	
Sandwich,	3,170 30	
Truro,	584 43	
Wellfleet,	494 58	
Yarmouth,	558 82	
		\$46,069 39
<i>Berkshire County.</i>		
Adams,	\$115 05	
Becket,	1,040 32	
Cheshire,	1,870 32	
Clarksburg,	168 23	
Dalton,	1,075 48	
Egremont,	5,180 23	
Florida,	1,976 85	
Great Barrington,	112 59	
Hancock,	7,191 04	
Hinsdale,	269 54	
Lanesborough,	319 82	
Lee,	3,756 50	
Lenox,	942 15	
North Adams,	22,074 61	
Pittsfield,	4,151 28	
Richmond,	1,143 42	
Savoy,	549 01	
Sheffield,	1,204 38	
Stockbridge,	244 51	
Williamstown,	1,085 93	
Windsor,	973 88	
		55,445 14
<i>Bristol County.</i>		
Acushnet,	\$14 13	
Attleboro,	3,958 13	
Amounts carried forward,	\$3,972 26	\$101,514 53

REPAIRS OF STATE HIGHWAYS — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i>	\$3,972 26	\$101,514 53
Berkley,	87 58	
Dartmouth,	14,122 62	
Dighton,	1,272 37	
Easton,	83 91	
Fairhaven,	479 64	
Fall River,	6 50	
Freetown,	2,654 11	
Mansfield,	168 54	
North Attleborough,	690 54	
Norton,	333 57	
Raynham,	267 86	
Rehoboth,	406 24	
Seekonk,	851 59	
Somerset,	21,773 85	
Swansea,	1,982 98	
Taunton,	16,048 30	
Westport,	8,958 31	
		74,160 77
<i>Dukes County.</i>		
Chilmark,	\$836 65	
Edgartown,	232 55	
Gay Head,	1,924 98	
Oak Bluffs,	279 00	
Tisbury,	4,553 31	
West Tisbury,	4,148 16	
		11,974 65
<i>Essex County.</i>		
Amesbury,	\$301 41	
Andover,	23,725 04	
Beverly,	2,324 05	
Danvers,	11 67	
Essex,	1,272 87	
Gloucester,	13,932 98	
Groveland,	164 14	
Hamilton,	706 58	
Haverhill,	826 08	
Ipswich,	5,035 31	
Lawrence,	177 53	
Lynn,	739 83	
Merrimac,	294 95	
Methuen,	610 47	
Middleton,	143 50	
Newbury,	678 98	
Newburyport,	239 52	
<i>Amounts carried forward,</i>	\$51,184 91	\$187,649 95

REPAIRS OF STATE HIGHWAYS — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$51,184 91	\$187,649 95
North Andover,	636 22	
Rockport,	220 25	
Rowley,	522 78	
Salem,	959 33	
Salisbury,	2,716 36	
Saugus,	701 73	
Swampscott,	2,600 73	
Wenham,	1,068 95	
West Newbury,	665 05	
		61,276 31
<i>Franklin County.</i>		
Ashfield,	\$983 84	
Bernardston,	993 40	
Buckland,	313 22	
Charlemont,	1,416 80	
Colrain,	120 57	
Deerfield,	3,800 35	
Erving,	800 81	
Gill,	96	
Greenfield,	819 94	
Montague,	20,921 22	
Northfield,	11,417 15	
Orange,	223 69	
Shelburne,	501 60	
Sunderland,	281 97	
Whately,	133 98	
		42,729 50
<i>Hampden County.</i>		
Agawam,	\$63 15	
Brimfield,	636 04	
Chester,	2,582 41	
Chicopee,	851 02	
East Longmeadow,	295 48	
Holyoke,	47 16	
Monson,	603 47	
Palmer,	7,419 73	
Russell,	295 56	
Wales,	48 95	
West Springfield,	2,123 74	
Westfield,	766 29	
Wilbraham,	34,029 37	
		49,762 37
<i>Amount carried forward,</i> . . .	. . .	\$341,418 13

REPAIRS OF STATE HIGHWAYS — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amount brought forward, . . .</i>	<i>. . .</i>	\$341,418 13
<i>Hampshire County.</i>		
Amherst,	\$710 67	
Belchertown,	606 65	
Easthampton,	37 09	
Goshen,	36 22	
Granby,	520 83	
Hadley,	398 96	
Hatfield,	340 26	
Huntington,	164 40	
Northampton,	116 73	
South Hadley,	573 86	
Southampton,	77 40	
Ware,	901 09	
Williamsburg,	182 83	
		4,666 99
<i>Middlesex County.</i>		
Acton,	\$494 06	
Ashby,	15,942 60	
Ashland,	189 48	
Ayer,	849 34	
Bedford,	153 44	
Billerica,	159 01	
Boxborough,	228 95	
Burlington,	908 04	
Chelmsford,	1,764 61	
Concord,	581 34	
Dracut,	1,001 79	
Framingham,	252 29	
Groton,	448 92	
Holliston,	783 61	
Hudson,	67 07	
Lexington,	583 67	
Lincoln,	2,612 42	
Littleton,	454 62	
Lowell,	7,771 95	
Marlborough,	15,542 82	
Medford,	46 34	
Melrose,	155 95	
Natick,	916 83	
Newton,	818 91	
North Reading,	607 67	
Pepperell,	710 30	
Reading,	6,266 24	
<i>Amounts carried forward, . . .</i>	<i>\$60,312 27</i>	<i>\$346,085 12</i>

REPAIRS OF STATE HIGHWAYS — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$60,312 27	\$346,085 12
Shirley,	450 92	
Somerville,	339 93	
Stoneham,	271 97	
Sudbury,	41,722 58	
Tewksbury,	14,350 46	
Townsend,	1,824 90	
Tyngsborough,	1,145 50	
Watertown,	930 22	
Wayland,	19,489 98	
Westford,	446 60	
Weston,	1,121 26	
Wilmington,	213 40	
Winchester,	276 66	
Woburn,	668 18	
		143,564 83
<i>Nantucket County.</i>		
Nantucket,	\$104 18	
		104 18
<i>Norfolk County.</i>		
Avon,	\$357 82	
Bellingham,	222 63	
Braintree,	317 92	
Canton,	3,361 43	
Cohasset,	339 86	
Dedham,	376 91	
Dover,	710 67	
Foxborough,	353 08	
Franklin,	828 08	
Holbrook,	116 95	
Milton,	550 08	
Needham,	194 05	
Norfolk,	1,030 71	
Norwood,	1,499 40	
Plainville,	834 32	
Quincy,	391 58	
Randolph,	332 91	
Sharon,	42 32	
Stoughton,	1,285 07	
Walpole,	4,144 70	
Wellesley,	644 73	
Westwood,	633 70	
Weymouth,	5,764 51	
Wrentham,	17,143 86	
		41,477 29
<i>Amount carried forward,</i> . . .	. . .	\$531,231 42

REPAIRS OF STATE HIGHWAYS — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amount brought forward, . . .</i>	<i>. . .</i>	\$531,231 42
<i>Plymouth County.</i>		
Abington,	\$8,566 89	
Bridgewater,	12,763 37	
Brockton,	3,380 54	
Duxbury,	901 10	
Hanover,	299 14	
Hingham,	11,574 40	
Kingston,	176 18	
Lakeville,	14,482 73	
Marion,	7,904 57	
Marshfield,	8,943 55	
Mattapoisett,	8,122 18	
Middleborough,	7,048 06	
Pembroke,	332 45	
Plymouth,	212 43	
Rochester,	4,055 78	
Rockland,	286 01	
Scituate,	10,322 93	
Wareham,	3,631 54	
West Bridgewater,	636 42	
Whitman,	377 65	
		104,017 92
<i>Suffolk County.</i>		
Boston,	\$49,123 89	
Chelsea,	411 12	
Revere,	629 59	
		50,164 60
<i>Worcester County.</i>		
Ashburnham,	\$1,302 13	
Athol,	258 67	
Auburn,	655 52	
Barre,	12,031 22	
Blackstone,	501 18	
Brookfield,	4,609 71	
Charlton,	2,468 18	
Douglas,	163 05	
Dudley,	647 79	
Fitchburg,	1,071 34	
Gardner,	419 72	
Grafton,	620 70	
Hardwick,	368 31	
Harvard,	297 82	
Holden,	538 89	
Lancaster,	248 79	
<i>Amounts carried forward, . . .</i>	<i>\$26,203 02</i>	<i>\$685,413 94</i>

REPAIRS OF STATE HIGHWAYS — *Concluded.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$26,203 02	\$685,413 94
Leicester,	1,206 80	
Leominster,	333 19	
Lunenburg,	2,113 96	
Milford,	412 84	
Millbury,	2,793 93	
New Braintree,	122 72	
North Brookfield,	353 61	
Northborough,	24,659 61	
Northbridge,	261 62	
Oxford,	560 33	
Paxton,	989 85	
Phillipston,	1,770 78	
Princeton,	486 19	
Rutland,	354 93	
Shrewsbury,	16,677 34	
Southborough,	326 39	
Southbridge,	1,651 18	
Spencer,	579 25	
Sterling,	810 14	
Sturbridge,	275 33	
Sutton,	393 09	
Templeton,	572 34	
Uxbridge,	555 00	
Warren,	132 52	
Webster,	343 77	
West Boylston,	675 24	
West Brookfield,	473 06	
Westborough,	638 98	
Westminster,	1,012 44	
Winchendon,	1,463 89	
Worcester,	345 29	
		89,548 63
		\$774,962 57

REPAIR AND MAINTENANCE OF TOWN AND COUNTY WAYS (CHAPTER 525, ACTS OF 1910).

TOWN OR CITY.	Amount.	Totals.
<i>Barnstable County.</i>		
Dennis,	\$843 99	\$843 99
<i>Berkshire County.</i>		
Becket,	\$2,239 70	29,043 38
Cheshire,	5,455 16	
Clarksburg,	1,761 34	
Lanesborough,	7,281 00	
Lee,	2,763 86	
New Ashford,	5,395 65	
New Marlborough,	690 81	
Richmond,	1,330 00	
Savoy,	429 90	
Sheffield,	2,079 46	
West Stockbridge,	389 36	
Williamstown,	1,027 14	
<i>Bristol County.</i>		
Acushnet,	\$3,500 00	11,766 29
Berkley,	1,050 00	
Dartmouth,	3,000 00	
Dighton,	37 13	
Freetown,	100 00	
Somerset,	79 16	
Westport,	4,000 00	
<i>Dukes County.</i>		
Edgartown,	\$2,475 89	4,951 44
Oak Bluffs,	2,475 55	
<i>Essex County.</i>		
Amesbury,	\$206 67	46,605 10
Andover,	1,000 00	
Danvers,	3,835 37	
Essex,	434 04	
Georgetown,	1,267 90	
Ipswich,	614 12	
Lynnfield,	1,012 39	
Newbury,	1,463 90	
Peabody,	2,376 57	
Rowley,	1,749 20	
Amounts carried forward,	\$13,960 16	

REPAIR AND MAINTENANCE, ETC. — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$13,960 16	\$46,605 10
Salisbury,	114 93	
Saugus,	2,330 08	
Topsfield,	1,965 75	18,370 92
<i>Franklin County.</i>		
Erving,	\$992 93	
Northfield,	972 45	
Rowe,	43 00	
Sunderland,	5,150 00	
Whately,	105 64	7,264 02
<i>Hampden County.</i>		
Blandford,	\$956 96	
Brimfield,	348 00	
East Longmeadow,	1,008 00	
Ludlow,	2,250 00	
Monson,	320 00	
Tolland,	2,001 64	
Wilbraham,	1,598 38	8,482 98
<i>Hampshire County.</i>		
Belchertown,	\$3,005 81	
Cummington,	117 25	
Easthampton,	1,596 23	
Goshen,	9 35	
Huntington,	693 59	
Plainfield,	2,200 00	
Southampton,	3,834 88	
Williamsburg,	580 50	12,037 61
<i>Middlesex County.</i>		
Acton,	\$1,079 50	
Ashby,	1,000 00	
Bedford,	3,334 25	
Billerica,	6,567 66	
Burlington,	800 00	
Dracut,	458 21	
Dunstable,	831 22	
Hopkinton,	1,532 47	
Hudson,	600 00	
Littleton,	195 23	
Natick,	654 40	
<i>Amounts carried forward,</i> . . .	\$17,052 94	\$92,760 63

REPAIR AND MAINTENANCE, ETC. — *Continued.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward,</i> . . .	\$17,052 94	\$92,760 63
North Reading,	2,750 00	
Pepperell,	418 90	
Reading,	2,058 35	
Stow,	58 40	
Sudbury,	1,065 61	
Townsend,	270 00	
Tyngsborough,	475 00	
Wakefield,	2,000 00	
Wayland,	2,015 35	
Westford,	1,290 39	
Wilmington,	2,118 65	
		31,573 59
<i>Norfolk County.</i>		
Bellingham,	\$800 00	
Franklin,	400 00	
Medfield,	1,330 00	
Millis,	1,674 83	
Needham,	1,500 00	
Walpole,	3,333 67	
		9,038 50
<i>Plymouth County.</i>		
Bridgewater,	\$2,457 23	
Carver,	1,950 00	
East Bridgewater,	4,165 00	
Kingston,	488 00	
Middleborough,	3,218 25	
Norwell,	1,377 09	
Plympton,	382 26	
Rochester,	768 36	
		14,806 19
<i>Worcester County.</i>		
Athol,	\$406 93	
Barre,	2,353 44	
Berlin,	852 37	
Bolton,	1,985 02	
Brookfield,	333 87	
Dudley,	997 29	
Gardner,	2,000 00	
Hardwick,	500 00	
Harvard,	2,762 58	
Holden,	91 00	
Hubbardston,	1,000 00	
Lancaster,	7,090 45	
<i>Amounts carried forward,</i> . . .	\$20,372 95	\$148,178 91

REPAIR AND MAINTENANCE, ETC. — *Concluded.*

TOWN OR CITY.	Amount.	Totals.
<i>Amounts brought forward, . . .</i>	\$20,372 95	\$148,178 91
Milford,	83 72	
Oakham,	88 51	
Oxford,	767 76	
Paxton,	444 23	
Petersham,	4,083 94	
Princeton,	933 25	
Rutland,	2,105 95	
Southbridge,	1,997 00	
Spencer,	5,985 50	
Sturbridge,	959 80	
Sutton,	11,302 25	
Templeton,	197 86	
Uxbridge,	1,032 69	
Warren,	8 25	
West Brookfield,	53 83	
Westminster,	141 15	
Winchendon,	60 67	
		50,619 31
		\$198,798 22

REPAIR AND MAINTENANCE, ETC. — *Concluded.*

Repairs of State highways,	\$774,962	57
Expenditures under chapter 525, Acts of 1910,	198,798	22
Cost of engineering,	91,972	01
Marking routes,	1,145	21
Analysis of tar and oil,	1,490	64
Traffic census,	6	00
Canceled checks,	6	50
Protest charges (Fred Gould),	1	77
Machinery account: —		
1 Buffalo Pitts maintenance roller,	\$3,950	00
11 automobiles,	3,882	81
2 Indian motor cycles,	330	00
8 heating kettles,	771	68
2 bicycles,	25	00
2 Glide road machines,	220	00
2 American Big Winner road machines,	635	00
2 American Champion road machines,	503	87
1 self-rotating hand hammer,	125	00
1 sweeper, with broom,	250	00
1 8-foot sweeper broom,	35	75
3 air compressors,	244	67
13 tents with flies,	252	00
2 stoves,	8	20
4 1-horse scrapers,	26	00
1 steel barrow,	6	00
1 Syracuse contractor's plow,	22	00
3 screens,	18	00
1 road drag,	3	50
4 tool boxes,	363	00
1 hand street-cleaner cart, complete,	54	00
2 brass Pyrene extinguishers,	13	15
1 No. 404 Champion forge,	22	50
3 pumps,	93	25
2 mixing pans for tar grout,	30	00
1 30-foot extension ladder,	7	50
Rent, light, heat and fuel,	644	26
Salaries and labor,	2,492	10
Freight and express,	776	54
Tools and apparatus,	5,645	23
Materials and repairs,	1,171	73
Supplies, parts and fittings,	1,396	44
Auto expense (supplies, repairs and storage),	13,074	75
Motor cycles (expense, supplies and repairs),	413	60
Miscellaneous items,	386	40
	<hr/>	
	37,893	93
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Amount carried forward,	\$1,106,276	85

Amount brought forward, \$1,106,276 85

AUTOMOBILE DEPARTMENT EXPENSE.

Salaries of clerks and clerical assistants,	\$61,945 52
Rent of offices,	797 97
Number plates, motor cycle seals and speed signs,	26,527 96
Printing,	10,743 16
Postage,	10,228 22
Typewriters purchased and rented,	2,341 28
Office supplies,	1,354 57
Cartage and storage,	1,644 02
Miscellaneous items, including express charges, car fares, telegrams and other minor office expenses,	683 01

Total, automobile department, 116,265 71

EXAMINER'S DEPARTMENT EXPENSE.

Salaries of inspectors and examiners,	\$21,857 06
Salaries of clerks and stenographers,	4,219 16
Rent,	194 25
Mileage books,	2,092 50
Traveling expenses,	7,576 35
Printing,	759 86
Postage, including stamped envelopes,	475 00
Office supplies,	298 43
Newspaper clippings,	130 00
Miscellaneous items,	51 45

Total, examiner's department, 37,654 06

Rebates of automobile fees, 15,294 75

Total, motor vehicle fees fund, \$1,275,491 37

GENERAL EXPENSES, DEC. 1, 1915, TO NOV. 30, 1916.

[Under Chapter 203, Special Acts of 1916.]

Salaries of commissioners,	\$13,000 00
Travel of commissioners,	3,256 90
Salaries of clerical assistants and principal assistant engineers,	29,624 04
Rent of offices,	1,930 00
Printing and binding annual report,	1,571 09

Amount carried forward, \$49,382 03

<i>Amount brought forward,</i>	\$49,382 03
Printing,	2,676 02
Postage, including postal cards and envelopes,	1,908 01
Office and typewriter supplies,	1,136 08
Telephone, including tolls,	565 76
Recording land takings and easements,	232 34
Advertising hearings,	68 62
Rental and repair of typewriters,	273 08
Repairs to steam road rollers and other road machinery,	18,002 24
Miscellaneous items, including express charges, car fares, telegrams and other minor office expenses,	435 20
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	\$74,679 38

Brightman Street bridge at Fall River: —

Pay rolls,	\$137 75
Salaries,	6,542 93
Electric service and lighting,	979 29
Telephone service,	35 80
Tools and supplies,	603 69
	<hr/>
	\$8,299 46

Merrimac River bridge at Newburyport: —

Pay rolls,	\$89 70
Salaries,	3,459 32
Electric service and lighting,	135 46
Telephone service,	36 10
Tools and supplies,	380 58
Repairs,	91 10
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	\$4,192 26

MISCELLANEOUS EXPENDITURES.

[Under Chapters 416 and 744, Acts of 1911, and Chapter 236, Acts of 1914.]

Expenditures for the repair of a certain highway in the town

of Truro,	\$466 83
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[Under Chapter 754, Acts of 1914.]

Expenditures for the construction of a State highway in the town of New Marlborough,

\$362 91

[Under Chapter 78, Resolves of 1914.]

Expenditures for the further construction of the River Road, so called, from the town of Williamstown to the city of Pittsfield (Lanesborough),

\$631 43

[Under Chapter 639, Acts of 1913.]

Expenditures for the laying out and construction of a so-called traffic road in the town of Revere, extending south-erly from the Point of Pines, \$102 98

[Under Chapter 659, Acts of 1914.]

Salisbury Beach, \$904 74

[Under Chapter 196, General Acts of 1915.]

Expenditures for the improvement and construction of Concord Avenue in the city of Cambridge, . . . \$23,408 12

[Under Chapter 242, General Acts of 1915.]

Expenditures for the improvement of a highway in the towns of Mashpee and Barnstable, \$6,572 64

[Under Chapter 229, General Acts of 1915.]

Expenditures for the improvement of a highway in the town of Ashburnham, \$3,639 69

[Under Chapter 230, General Acts of 1915, and Chapter 204, General Acts of 1916.]

Expenditures for the construction of a State highway from the town of Norton to the city of Taunton, . . . \$14,522 81.

[Under Chapter 257, General Acts of 1915, and Chapter 212, General Acts of 1916.]

Expenditures for the improvement of a highway between North Brookfield and Barre Plains, \$9,108 66

[Under Chapter 202, General Acts of 1916.]

Expenditures for the construction and improvement of the River Road in the town of Southbridge, \$1,242 81

[Under Chapter 203, General Acts of 1916.]

Expenditures for the construction and improvement of the Black North Route, from Lowell to Lawrence, in the towns of Dracut and Methuen, \$2,812 10

[Under Chapter 205, General Acts of 1916.]

Expenditures for the construction and improvement of a highway in the towns of Plymouth and Bourne, . . . \$1,218 54

[Under Chapter 206, General Acts of 1916.]

Expenditures for the construction and improvement of a highway in the town of Pelham, \$585 60

[Under Chapter 210, General Acts of 1916.]

Expenditures for the construction and improvement of a highway between Gardner and Rutland, \$4,868 04

[Under Chapter 214, General Acts of 1916.]

Expenditures for the construction and improvement of Rindge Road in the towns of Ashburnham and Ashby,	\$5,410 03
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[Under Chapter 213, General Acts of 1916.]

Expenditures for the construction and maintenance of a State highway in the town of Hingham,	\$249 86
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[Under Chapter 215, General Acts of 1916.]

Expenditures for the construction and improvement of a highway in the town of Lunenburg, between the town of Shirley and city of Leominster,	\$5,000 00
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[Under Chapter 217, General Acts of 1916.]

Expenditures for the construction and improvement of a highway in the towns of Phillipston and Templeton,	\$2,733 18
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[Under Chapter 219, General Acts of 1916.]

Expenditures for the construction and improvement of the highway leading from Milford to Southborough, through the town of Hopkinton,	\$3,660 68
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[Under Chapter 230, General Acts of 1916.]

Expenditures for purchasing or taking by right of eminent domain land for the purpose of laying out and con- structing a highway in the city of Revere,	\$38,750 50
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[Under Chapter 353, Special Acts of 1916.]

Rent,	\$807 45
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SUMMARY OF EXPENDITURES.

For construction,	\$494,717 70
For construction under "small town" acts,	84,394 18
For western Massachusetts roadways under chapter 221, General Acts of 1915,	377,496 90
For road repair and maintenance, from revenue,	424,119 97
For road construction under chapter 525, Acts of 1910,	198,798 22
For road repair and maintenance (motor vehicle fees fund),	907,478 63
For expenditures connected with automobile registration,	116,265 71
For expense of examiners and investigators,	37,654 06
For rebates of automobile fees under chapter 534, Acts of 1909,	15,294 75
For general office expense under chapter 208, Special Acts of 1916,	74,679 38

<i>Amount carried forward,</i>	<i>\$2,730,899 50</i>
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<i>Amount brought forward,</i>	\$2,730,899 50
For expenditures under chapter 208, Special Acts of 1915, (bridges),	12,491 72
For expenditures under chapter 208, Special Acts of 1915, (Truro),	466 83
For expenditures under chapter 754, Acts of 1914,	362 91
For expenditures under chapter 78, Resolves of 1914,	631 43
For expenditures under chapter 639, Acts of 1913,	102 98
For expenditures under chapter 659, Acts of 1914,	904 74
For expenditures under chapter 196, General Acts of 1915,	23,408 12
For expenditures under chapter 242, General Acts of 1915,	6,572 64
For expenditures under chapter 229, General Acts of 1915,	3,639 69
For expenditures under chapter 230, General Acts of 1915, and chapter 204, General Acts of 1916,	14,522 81
For expenditures under chapter 257, General Acts of 1915, and chapter 212, General Acts of 1916,	9,108 66
For expenditures under chapter 202, General Acts of 1916,	1,242 81
For expenditures under chapter 203, General Acts of 1916,	2,812 10
For expenditures under chapter 205, General Acts of 1916,	1,218 54
For expenditures under chapter 206, General Acts of 1916,	585 60
For expenditures under chapter 210, General Acts of 1916,	4,868 04
For expenditures under chapter 214, General Acts of 1916,	5,410 03
For expenditures under chapter 213, General Acts of 1916,	249 86
For expenditures under chapter 215, General Acts of 1916,	5,000 00
For expenditures under chapter 217, General Acts of 1916,	2,733 18
For expenditures under chapter 219, General Acts of 1916,	3,660 68
For expenditures under chapter 230, General Acts of 1916,	38,750 50
For expenditures under chapter 353, Special Acts of 1916,	807 45
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	\$2,870,450 82

WM. D. SOHIER,
F. D. KEMP,
JAMES W. SYNAN,
Massachusetts Highway Commission.

APPENDIX A.

RELATING TO THE WORK OF THE AUTOMOBILE DEPARTMENT.

Statement showing the Number of Registration Certificates and Licenses to operate issued during the Fiscal Year 1916, also the Fees received for the Same, together with the Fees for Examinations, for Copies of Certificates of Registration and Licenses, etc., and Fines for Violation of the Automobile Law.

Certificates of registration: —

•Automobiles,	136,809	\$1,238,376 50
Motor cycles,	10,713	20,582 00
Manufacturers and dealers,	1,977	59,438 50

Licenses to operate: —

Operators,	45,975 at \$2 00	91,950 00
Chauffeurs,	10,928 at 2 00	21,856 00
Operators' renewals,	56,597 at 1 00	56,597 00
Operators' renewals,	26,065 at 50	13,032 50
Chauffeurs' renewals,	21,821 at 1 00	21,821 00
Chauffeurs' renewals,	10,210 at 50	5,105 00
Examinations,	12,506 at 2 00	25,012 00
Copies of certificates and licenses furnished,	5,700 at 50	2,850 00
Number plates and seals,		2,193 75

Gross receipts,	\$1,558,814 25
Court fines received by the Treasurer and Receiver-General,	52,999 14

	\$1,611,813 39
Deduct rebates on registration fees,	14,501 75

	\$1,597,311 64
Miscellaneous receipts, including interest on deposits,	5,646 56

Total receipts for the year,	\$1,602,958 20
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REPORT OF THE EXAMINING AND INVESTIGATING DEPARTMENT.

F. I. BIELER, *Secretary, Massachusetts Highway Commission.*

DEAR SIR: — I respectfully submit the following as the tenth annual report of the examining and investigating department, for the fiscal year ending Nov. 30, 1916.

EXAMINATIONS.

During the year examinations were held daily in Boston, and either semiweekly or once a week in Pittsfield, Springfield, Worcester, Fitchburg, Brockton, New Bedford, Fall River, Lowell and Salem. By request, a few examinations were conducted in other cities, these examinations being given, in most cases, to members of the fire and police departments and other municipal employees.

The following table gives a comparison of the examinations conducted during the year 1916 with those of 1915: —

	1915.	1916.
Total number of examinations (chauffeurs),	10,418	12,386
Total number of examinations (operators),	78	123
Total number of examinations (chauffeurs reported unfit),	3,724	3,823
Total number of examinations (operators reported unfit),	39	58
Total number of chauffeurs examined,	7,305	9,124
Total number of chauffeurs passed,	6,694	8,563
Total number of chauffeurs failed to receive licenses,	611	561
Total number of operators examined,	61	108
Total number of operators passed,	39	65
Total number of operators failed to receive licenses,	22	43

It may be seen from the above table that there was an increase of 1,866 in the number of persons examined, and an increase of 2,013 in the number of examinations conducted; 118 more persons were reported unfit. The number of persons who finally passed the examination increased 1,895. On the basis of percentage, 6.54 per cent. finally failed, as against 8.59 per cent. for 1915. Of the total number of persons examined, 108 were applicants for operators' licenses and were given 123 examinations; 65 finally passed and 43 failed. Of the total number of examinations, 5,729 were conducted in Boston; the balance, 6,780, in other cities. Eight thousand eight hundred and thirty-one of these examinations were conducted by three examiners; the balance, 3,678, by the inspectors.

INVESTIGATIONS AND PROSECUTIONS.

The following table is a comparison of the cases investigated and reported on during the fiscal years 1915 and 1916: —

	1915.	1916.
Accidents (nonfatal),	231	301
Accidents (fatal),	297	325
Accidents (brief reports),	385	579
General reputation,	55	66
Miscellaneous,	194	183
Garages, dealers,	117	16
Total number of reports received from investigators, . . .	1,279	1,470
Garages inspected,	304	423
Prosecutions,	74	78
Total amount of fines in above cases,	\$2,760	\$2,283
Number sentenced to imprisonment,	- ¹	4

¹ No record in 1915.

There were 324 fatal accidents, resulting in 333 deaths. Three hundred and eight of these accidents occurred in Massachusetts, and resulted in 315 deaths. Four deaths occurred in New Hampshire, 6 in Connecticut, 4 in Maine, and 4 in Rhode Island. The accidents which occurred in other States were investigated for the reason that the operators were residents of Massachusetts. Two of the deaths occurring in Massachusetts were the result of asphyxiation by gas fumes, and are only indirectly connected with the operation of motor vehicles. Of the 325 reports received from investigators concerning fatal accidents, 10 occurred during the fiscal year 1915.

During the year we inspected the record book and number plates of 423 garages and dealers, and found that the majority of them were complying with the law. Sixteen reports were submitted to the Board concerning dealers who were found not entitled to dealers' registration. If we found that a garage owner was not keeping a proper record of motor vehicles which entered and left his place of business, the department sent a cautionary letter calling his attention to the matter.

We investigated 579 accidents on which brief reports were filed, they not being considered serious enough to call to the attention of the Board. In addition, many accidents were inquired into on which no record was kept.

Work of a more or less miscellaneous nature which was assigned to the investigators, — such as serving of suspension and

revocation notices, the securing of licenses that had been suspended or revoked, investigating complaints made to the Commission, habits and general reputation of operators, — so greatly increased that it was found necessary to assign one inspector solely to this line of work.

In August the State was divided into 14 districts, and an investigator assigned to each section. The centralizing of the work of each man into a small district resulted in the investigation of many accidents that otherwise might not have been brought to our attention.

During the month of July the department was increased by the appointment of five investigators and examiners. In June Inspector Alfred F. Foote received orders to mobilize at Framingham to go to the Mexican border. He returned and reported to the department on Nov. 1, 1916.

We received approximately 18,000 newspaper clippings referring to accidents and prosecutions in which motor vehicles were involved. About 10 per cent. of these clippings concerned road building, etc.

In compliance with chapter 530 of the Acts of 1913, we received approximately 16,000 letters from operators who were involved in accidents. These letters are filed under the name of the operator, and in addition cards are written showing the location of each accident. A large number of the letters refer to accidents of a very trivial nature.

From these letters and newspaper clippings, accidents in which motor vehicles were involved have been tabulated.

DEATHS AND INJURIES.

A comparison of the statistics for the year 1916 with those of 1915 is given below: —

	KILLED.		INJURED.	
	1915.	1916.	1915.	1916.
Pedestrians,	183	219	3,110	4,710
Occupants of automobiles,	84	68	1,521	2,363
Motor cycle riders,	15	15	636	895
Bicycle riders,	3	7	497	613
Occupants of carriages,	4	5	421	521
Street car passengers,	—	1	12	29
Totals,	294	315	6,197	9,131

The above statistics are a summary of the deaths and injuries resulting from accidents in which all types of motor vehicles were involved. On a basis of percentage, there was an increase of approximately 7 per cent. in the number of persons killed, and 47 per cent. in the number injured. About three-quarters of the accidents which resulted in deaths and injuries occurred in the daytime, and about one-quarter after dark.

The following schedules show the number of deaths and injuries in automobile and motor cycle accidents, apportioned under separate headings for the fiscal years 1915 and 1916:—

SCHEDULE OF KILLED AND INJURED.

Automobile Accidents.

	KILLED.		INJURED.	
	1915.	1916.	1915.	1916.
Pedestrians,	181	213	3,038	4,556
Occupants of automobiles,	83	68	1,515	2,355
Occupants of carriages,	4	5	419	519
Bicycle riders,	3	7	490	598
Street car passengers,	—	1	12	29
Totals,	271	294	5,474	8,057

Motor Cycle Accidents.

	KILLED.		INJURED.	
	1915.	1916.	1915.	1916.
Pedestrians,	7	6	72	154
Motor cycle riders,	15	15	636	895
Occupants of automobiles,	1	—	6	8
Occupants of carriages,	—	—	2	2
Bicycle riders,	—	—	7	15
Totals,	23	21	723	1,074

PROBATION.

During the fiscal year, 14 chauffeurs or operators were required to report to a representative of the Commission. Nine reported regularly while 5, for violating their probation agreement, had their licenses either suspended or revoked. In 2 cases licenses were suspended twice. Five were reinstated and again placed on probation.

*Comparison of Analysis of Abstracts of Court Records for the Fiscal Year
1915 with the Fiscal Year 1916.*

	1915.	1916.
Number of courts that have forwarded abstracts,	85	86
Total number of abstracts received,	7,260	9,279
Persons guilty of operating unlawfully,	6,522	8,298
Persons not guilty of operating unlawfully,	278	349
Cases appealed to a higher court,	617	625
Complaints placed on file,	1,842	2,558
Complaints <i>not pressed</i> ,	303	280
Defendants defaulted,	50	148
Persons committed to imprisonment,	52	81
Complaints brought:—		
For overspeeding,	2,506	2,948
For reckless operating,	150	197
For operating while intoxicated,	288	435
For using automobile without authority,	130	151
For endangering lives and safety of the public,	112	177
For failing to stop after causing injury,	48	135
For improper display or no register number,	185	155
For operating without a license,	731	883
For operating without carrying registration certificate,	185	320
For operating an unregistered motor vehicle,	94	157
For refusing to stop when signaled by officer,	171	229
For operating with unlighted lamps,	356	488
For operating with dazzling lights,	- ¹	85
For violations of park rules,	156	245
For failing to give signal when approaching intersecting way,	1,455	1,979
For miscellaneous offences,	983	932

¹ No record in 1915.

Fines, etc., as shown by Court Abstracts.

	1915.	1916.
For violating State statutes,	\$41,474 00	\$56,195 00
For violating metropolitan park rules,	713 00	806 00
For cost of court,	2,021 65	3,851 00
Totals,	\$44,208 65	\$60,852 00

Respectfully submitted,

F. L. AUSTIN,

Chief Examiner and Inspector.

DEC. 26, 1916.

F. L. AUSTIN, *Chief Examiner and Inspector.*

DEAR SIRs:—The following is respectfully submitted as a report of the results of our examination and analysis of investigators' reports, made for the purpose of determining the causes of motor vehicle accidents.

Because of the large number of accidents occurring on the highways, where not only motor vehicles but also horse-drawn

vehicles, electric cars, etc., are involved, it has been impossible for the inspectors to investigate each and every case that has happened in their several districts, but all of the fatal accidents were investigated and reported upon, in accordance with the requirements of the law, as were also those which were serious, although nonfatal, and a large number of minor accidents. Under these circumstances, it is obvious that no report can be made which will show accurately the causes of all accidents, and whether they were preventable or unavoidable, but for the purpose of determining as far as possible the causes of accidents, the reports of the investigators in 675 of the more serious cases have been read and analyzed carefully to find out where, under what conditions, and, as far as possible, why each accident happened. The results obtained were as follows: —

Four hundred and one of these 675 cases happened in the daytime, and 274 in the dusk, or after dark. Two hundred and twenty-five happened on country roads, and 450 in city or town streets. Involved in these accidents were 246 chauffeurs; 413 private male operators; 24 female operators; 54 Massachusetts operators who were unlicensed in Massachusetts; 18 who were unlicensed in any State; and 5 who were licensed or had a right to operate in other States, and who consequently had a right to operate in Massachusetts under the nonresident provisions of our motor vehicle law.

TYPES OF VEHICLES.

Five hundred and fifty-nine pleasure cars, 43 motor cycles, 9 motor cycles with side cars attached, 3 electric trucks, 129 trucks, 1 ambulance, 8 jitney busses, 1 police patrol automobile, and 2 fire trucks were involved in these accidents.

SPEED.

In the figures given below for speed, the estimate of the operator has not been taken, but all the evidence in the case was considered, especially that of bystanders, and more particularly what actually occurred, as, for instance, within what distance the automobile stopped.

There were 218 cases where the speed was "slow," less than 12 miles per hour. In 210 cases it was "medium," 12 to 18 miles per hour. In 134 cases it was "fast," 18 to 25 miles per hour; and in 108 cases, where the speed was called "excessive," it was greater than 25 miles per hour. In 3 cases the motor vehicle was

standing still when a pedestrian either ran or fell against it, while in 2 other cases the speed was unknown because the operator drove away after the accident and there were no witnesses. One hundred and eighty-two of the accidents where the speed was "slow" happened on city or town streets. Often the motor vehicle in these cases was not going faster than 5 or 6 miles per hour. Thirty-six cases at "slow" speed happened on country roads. One hundred and forty-five cases at "medium" speed occurred on city or town streets, and 65 at "medium" speed occurred on country roads. There were 77 cases of "fast" speed on city or town streets, and 57 on country roads. The speed was considered "excessive" in 40 of the cases on city or town streets, and in 68 on country roads. In 70 cases on city or town streets and 33 on country roads the speed was considered "too fast for conditions." Sixty-three accidents were collisions at intersections of streets, and were due to the operators approaching the intersections either too fast, inattentively or failing to observe the rules of the road.

In the cases where the speed was considered "too fast for conditions," the accidents happened where there were a number of people or vehicles on the highway in the immediate vicinity, or where the operator drove faster than he should have at an intersection of streets or around a curve. In these cases, the speed was considered too fast for the particular places, although under other conditions it would have been perfectly proper.

CAUSES OF ACCIDENTS TO PEDESTRIANS.

In the 675 cases examined, 212 pedestrians were killed and 115 injured on city or town streets, while 53 were killed and 49 injured on country roads. (For the purposes of this classification we have included 22 other users of the highway, including 8 boys who were stealing rides on motor vehicles, 9 bicycle riders as well as 5 others.)

The operators were held "at fault" in 94 of these cases. In 43 of these 94 not only was the operator at fault, but the pedestrian was also to blame for the accident. In 162 of the remaining 171 fatal cases the pedestrian was wholly at fault. In 3 no one could be considered to blame, and in 6 the circumstances were unknown because the facts were unobtainable.

In the 164 nonfatal cases, the operator was wholly at fault in 136, the pedestrian in 8, and both in 19. In 1 of these cases the circumstances were unknown.

When there is a fatal accident in which a motor vehicle is involved, the law requires the Commission to suspend the license of the operator, have an investigation made of the accident, and to revoke the license of the operator unless the Commission finds affirmatively that the accident happened "without serious fault" on his part. The interpretation that the Commission has put upon the term "without serious fault" has been a very strict one so far as the operator has been concerned; to wit, if the operator was operating too fast, or not paying sufficient attention for an instant, etc., and could or should have prevented the accident by slowing up or stopping in time, the Commission has invariably found the operator at fault, although the person injured, the pedestrian, team driver, bicyclist, or other user of the highway may have been equally, and often more, at fault. In no case was the operator held not at fault where he had a clear view, and the pedestrian, on a city street, walked 15 feet or more where he could or should have been seen before being hit. The operators of the motor vehicles were held at fault in 185 non-fatal cases. In 39 cases the operators drove away without disclosing their identity. Thirty-one of these were later apprehended, and 8 have not yet been caught.

OPERATORS KILLED OR INJURED.

In 40 cases where the operators themselves were killed, it is obvious that the Commission could take no other action than to place the cases on file. In 6 of these, the operators drove onto railroad crossings and were killed by trains. In 16 the automobiles overturned, either on account of skidding, excessive speed or careless driving. Five were killed while operating motor cycles. Twenty-six operators were injured in accidents which occurred on city or town streets, and 27 on country roads.

OPERATORS NOT AT FAULT.

There were 183 fatal cases where the operator was held not at fault. In 67 of these, the pedestrian (child or adult) either stepped or ran out from behind another automobile, street car, team, or some object, directly in front of a moving motor vehicle which was so near that the operator had no chance to stop, or, after crossing ahead, stepped back directly in front of it. In 13 cases, the pedestrian stopped as if to allow the moving motor vehicle to pass, and then suddenly ran in front of it; while in 34 other cases, the pedestrian stepped from the right curb directly

in front of the machine. In 1 case, a man jumped from a moving street car in front of a passing automobile. The operator tried to clear him by swerving aside, but failed to do so and struck the man who jumped from the car, and also a pedestrian; both were killed. In 2 cases, draw tenders opened bridges after the automobiles had driven upon them. The machines were precipitated into the water, and one person in each instance was drowned. Eight boys stealing rides and 9 bicyclists were killed, as were 5 persons on other vehicles.

OCCUPANTS KILLED OR INJURED.

Twenty-nine occupants of the motor vehicles were killed, and 50 injured, in those accidents which happened on city or town streets. Forty-two were killed and 107 injured where the accidents happened on country roads. Seven of these occupants fell from the motor vehicles they were riding upon. In 26 cases the operator of the automobile carelessly or recklessly ran his car off the road, and it overturned. In 20 cases where occupants were killed or injured, the operators were intoxicated. One occupant was killed and 4 seriously injured when an operator turned out to pass another automobile and collided with one coming in the opposite direction. In 8 cases the operator drove too close to a motor vehicle he was passing and collided with it. In 1 case a large touring car operated by an out-of-State operator ran off the road, and 1 occupant was killed and 10 injured. In another, the driver of a jitney bus at an intersection of streets turned around to take something from the hands of a passenger and the jitney bus collided with another automobile. One occupant was killed and 4 were injured in this case. Six operators drove onto railroad crossings, and the machines they were driving were struck by trains. Three of these accidents occurred in other States, one in each, but were investigated because Massachusetts operators were involved.

WOMEN OPERATORS.

There were 27 women operators involved in the 675 accidents analyzed. Of these, 1 was held at fault and 7 were exonerated in fatal cases. Fourteen were found to have been operating improperly and 5 were held blameless in nonfatal accidents. The woman held "at fault" in the fatal case struck a pedestrian, at an intersection of streets. In the 7 fatal cases where women

operators were exonerated, 1 was where a bicyclist tried to dodge into a cross street ahead of the automobile. In another, a man walked into the side of the car. In 1 case a girl ran from the right sidewalk, and in another case a boy ran from an alley directly in front of the automobile. A jitney bus ran into the woman operator's automobile in 1 case. In another, a trolley car ran into the automobile the woman was driving, and in another, the woman's car collided with an automobile truck. In the 14 nonfatal accidents where women operators were held to be operating improperly, 1 drove off the side of a bridge into a brook, 3 became confused and did not keep their cars under proper control, 1 was driving too fast for conditions, 3 failed to slow down or stop when they saw pedestrians crossing the street, 1 ran into a motor cycle while overtaking and passing another automobile, and 1 drove from behind a standing street car and collided with another motor vehicle. Two of these accidents were the result of the automobiles skidding on wet pavements, and 2 were collisions with other automobiles at street corners. In the 5 nonfatal cases where the women operators were found blameless, male operators were at fault in 3, and children in 2.

OPERATOR AND PEDESTRIAN BOTH AT FAULT.

The total number of pedestrians killed and injured in the cases examined was 429. (For the purposes of this classification we have included 22 other users of the highway, such as 8 boys stealing rides, 9 bicyclists, and 5 others.) The number of operators' licenses suspended or revoked in consequence of the operators being found at fault was 249.

In a large number of these cases the pedestrian was also at fault, because he started across the street without looking when the motor vehicle was near, but the operator has been held at fault if he was running too fast under all the conditions, or did not notice the pedestrian as soon as he should have seen him, or did not try to stop as soon as he observed him. In 55 of these cases the operator saw the pedestrian, but wrongly assumed that he would stop and allow the motor vehicle to pass; while in 40 cases the operator was not paying proper attention and did not see the pedestrian soon enough to avoid him.

Children were injured in quite a number of these cases, where, although they were undoubtedly careless, the accident could have been averted if the operator had, as he should have done, anticipated the child's doing the wrong and unexpected thing.

DEFECTIVE MOTOR VEHICLES.

In 5 cases the accident happened because the motor vehicles were out of order. In 2 of these cases the brakes were defective. In 1 the chain on a motor cycle broke. In another, the operator lost control because he had neglected to replace a broken spring bolt. The other case was one in which the side car attachment broke away from a motor cycle.

COLLISIONS WITH STREET CARS.

Fatal:—

Operator of motor vehicle at fault,	7
Operator of motor vehicle not at fault,	2

Nonfatal:—

Operator of motor vehicle at fault,	14
Operator of motor vehicle not at fault,	1

In one case a passenger on the running board of a street car was knocked off and killed as the street car was passing an automobile. The operator of the motor vehicle was not at fault because the truck was standing still and the passenger was on the lower running board and too far out to pass the truck in safety. The motorman was unable to stop after he saw the truck.

COLLISIONS WITH TEAMS.

Fatal:—

Operator of motor vehicle at fault,	4
Operator of motor vehicle not at fault,	1

Nonfatal:—

Operator of motor vehicle at fault,	36
Operator of motor vehicle not at fault,	—

ACCIDENTS WHERE NO ONE WAS INJURED.

In 116 of the cases examined, no person was injured, and the only damage was to the motor vehicles involved. In 106 of these, the operators' licenses were suspended for periods of from thirty to sixty days because they were operating in an improper manner. They were driving either too fast, on the wrong side of the road, too fast for conditions, or not paying sufficient attention to their surroundings.

OPERATORS WHO DID NOT STOP.

There were 39 cases where the operators failed to stop and disclose their identity at the time of the accident. Thirty-one of these operators were apprehended later and punished. Eight have not yet been caught. Six of these 8 accidents happened at night, and 2 in the daytime. In 1 of these cases a seventeen-year-old boy, walking on a country road at night, was killed. In another, a man who was walking on a State road at night was killed. In a third, the automobile struck a team on a country road at night; no one was injured in this accident, although the wagon was broken and the occupants thrown out. A motor cycle struck and killed a child on a city street in the daytime in 1 case; in another, an automobile struck two boys who were riding on a bicycle at night, killing one and injuring the other. Two men walking on a country road at night were run down; one was killed and the other seriously injured. The automobile stopped and the occupants talked with the injured man while he was still in a semiconscious condition, but drove away without making themselves known. A track oiler was struck on a city street at night by an automobile which sped away; and in one instance, an automobile on a parkway, in the daytime, was struck by a passing automobile in such a way as to make the first operator lose control of his machine and run into a tree. He was fatally injured.

In none of these cases were there any witnesses who obtained the registration numbers of the automobiles involved.

REMARKS.

Four times the number of pedestrians were killed on city or town streets as were killed on country roads. It is to be deplored that the slight degree of care necessary to have prevented a large number of these accidents was not exercised.

In altogether too many cases the operator of the motor vehicle takes it for granted that at the sound of his horn the pedestrian who has started across the street will stop, but the pedestrian, failing to hear the signal, does not, and by the time the operator realizes the situation, he is too near the pedestrian to avoid hitting him by stopping his car. The usual result in these cases is that the operator tries to go around the pedestrian, who catches a glimpse of the automobile at the last moment, and in trying to dodge it runs in front of it. Slowing down when the pedestrian is first seen will prevent most of these accidents.

Too many operators drive faster than they should on city streets when running close to the sidewalks on which there are large numbers of people walking. Under these conditions accidents would be prevented if the operator drove more slowly and always anticipated the likelihood of some one thoughtlessly stepping from the sidewalk to cross the street.

Being careful not to drive too near to pedestrians crossing in front of the automobile will prevent accidents, for in a number of cases where the operator has gauged the speed of his car so that it will barely clear the pedestrian, the latter has stepped back and been killed or injured.

When passing standing vehicles, the operator should always be on the alert for persons stepping out from behind them, and he should be equally watchful and ready for an emergency stop when passing groups of children, either on the sidewalk or on the road, for they are more than likely to dart suddenly in front of the automobile.

The operator also should realize the danger when passing street cars going in the opposite direction, particularly when they are starting after having stopped to allow passengers to get on or off. In many instances a passenger who has alighted from the car, or a pedestrian who has waited for the car to move on, will start to cross the street behind it and step in front of the automobile.

Misunderstanding of intentions on the part of pedestrians and operators as to what each is going to do often results in an accident. The rule for the operator to follow in such cases is, "When in doubt, stop."

In many of these situations, slight care on the part of the operators would prevent accidents in spite of the carelessness of the pedestrians, and the number of accidents, especially in cities and towns, would appreciably decrease.

The particular duty assigned to us was to determine as nearly as we could the causes of the accidents in which motor vehicles were involved. We have indicated above how in our opinion the operator of the motor vehicle could have avoided having an accident.

ACCIDENTS WHERE PEDESTRIANS WERE KILLED OR INJURED.

As has been stated above, in the 675 cases examined 429 pedestrians were killed or injured. (We have classified among pedestrians 22 other users of the highway, including 8 boys

stealing rides, 9 bicyclists, and 5 others who were killed.) Four-fifths of the 265 pedestrians were killed on city streets, and of the 164 pedestrians that were injured, 115 were on city streets. As we have stated, many of these accidents would have been avoided by a little more care or attention on the part of the operator, even when the pedestrian was inattentive or careless. A little care on the part of the pedestrian would also have prevented many of these accidents.

In the 265 cases in which pedestrians (included in the above classification) were killed, the pedestrian was in our opinion wholly at fault in 162 and partly to blame in 43. The operator was wholly to blame in 51, and partly at fault in 43. In 6 cases no facts were obtainable, and 3 might be called almost inevitable accidents.

Two hundred and five deaths out of the 265 would not have occurred if the pedestrian had exercised the ordinary precaution of looking before stepping into the street, and making sure that no motor vehicle was approaching.

In 94 of these fatal cases the operator could and should have avoided the accident, but in 43 of these same cases the pedestrian, if he had exercised reasonable care, would also have prevented the accident.

In the 164 cases in which pedestrians were injured, the operator was wholly at fault in 136, the pedestrian was wholly to blame in 8, and both were in fault in 19. In 1 case the facts could not be ascertained.

In other words, in 232 of 429 such cases, in which pedestrians were killed or injured, they would not have been killed or injured if they had stopped and looked. In more than half the cases they failed to take this ordinary precaution.

In 205 of 265 cases in which pedestrians were killed, this ordinary precaution would have prevented the fatality. Reasonable care on the part of the pedestrian would have prevented more than three-quarters of all these deaths. The pedestrian as well as the operator should exercise reasonable care. He should "stop, look and listen."

WILLIAM MACCONNELL.
ERNEST L. BLISH.
HARRY C. ELLIS.
ALBERT S. OLSSON.
ALFRED F. FOOTE.
ANTHONY A. BONZAGNI.

APPENDIX B.

RELATING TO THE CARE OF SHADE TREES ON STATE HIGHWAYS.

List of Towns and Cities in which Work has been done by the State Forester's Department in cleaning and spraying Trees on State Highways for suppressing Gypsy and Brown-tail Moths and Elm Leaf Beetles, and the Amount expended in Each Municipality.

Abington,	\$20 60	Dover,	\$73 15
Acton,	135 13	Dracut,	76 90
Agawam,	28 50	Duxbury,	70 94
Amesbury,	35 89	Easthampton,	19 50
Amherst,	35 00	Essex,	21 74
Andover,	51 65	Falmouth,	164 85
Ashburnham,	77 25	Fitchburg,	85 11
Ashby,	57 50	Foxborough,	22 96
Ashland,	38 65	Framingham,	84 71
Attleboro,	21 07	Franklin,	38 00
Avon,	10 30	Gardner,	13 55
Ayer,	40 35	Gloucester,	71 14
Barnstable,	121 65	Grafton,	55 50
Barre,	49 98	Greenfield,	36 90
Bedford,	45 15	Groton,	20 18
Beverly,	186 46	Groveland,	11 03
Billerica,	72 44	Hadley,	50 00
Bourne,	150 57	Hamilton,	69 52
Boxborough,	116 40	Hanover,	15 68
Braintree,	25 00	Harvard,	50 33
Brewster,	87 00	Harwich,	6 00
Bridgewater,	28 72	Haverhill,	137 36
Brookfield,	42 39	Hingham,	20 11
Burlington,	131 00	Holden,	8 51
Canton,	50 20	Holliston,	23 27
Chelmsford,	123 30	Hudson,	33 98
Chicopee,	37 50	Ipswich,	40 80
Cohasset,	55 22	Kingston,	4 18
Concord,	380 49	Lakeville,	17 00
Dedham,	56 25	Lancaster,	34 49
Deerfield,	9 55	Leominster,	44 24
Dennis,	208 75	Lexington,	107 51

Lincoln,	\$58 73	Shirley,	\$22 75
Littleton,	79 16	Shrewsbury,	119 10
Lowell,	52 30	South Hadley,	55 00
Lunenburg,	88 14	Southborough,	47 80
Marion,	15 70	Sterling,	150 90
Marlborough,	286 73	Stockbridge,	79 20
Marshfield,	97 05	Stoneham,	82 16
Mashpee,	24 10	Sudbury,	149 51
Melrose,	41 98	Sutton,	12 20
Merrimac,	29 83	Taunton,	10 40
Methuen,	71 65	Templeton,	45 55
Middleborough,	60 25	Tewksbury,	110 96
Middleton,	11 20	Townsend,	93 00
Millbury,	29 86	Tyngsborough,	171 00
Milton,	10 00	Uxbridge,	14 74
Montague,	30 50	Ware,	2 50
Natick,	72 04	Wareham,	39 61
Needham,	64 16	Warren,	48 79
Newbury,	52 39	Wayland,	55 11
Newburyport,	23 58	Wellfleet,	19 75
North Adams,	57 80	Wenham,	107 74
North Andover,	153 01	West Boylston,	62 85
North Reading,	58 25	West Bridgewater,	26 47
Northborough,	108 98	West Brookfield,	27 95
Northbridge,	6 00	West Newbury,	107 35
Northfield,	75 00	West Springfield,	35 00
Norton,	25 50	Westborough,	26 77
Norwood,	86 15	Westfield,	55 00
Orleans,	27 60	Westford,	142 80
Palmer,	41 83	Westminster,	42 71
Pembroke,	35 18	Weston,	83 00
Pepperell,	84 81	Westwood,	24 00
Princeton,	7 50	Weymouth,	122 29
Quincy,	19 90	Williamstown,	55 90
Reading,	104 00	Wilmington,	73 41
Rochester,	44 45	Winchester,	66 63
Rockport,	11 40	Woburn,	176 93
Rowley,	91 64	Worcester,	67 60
Salisbury,	96 79	Yarmouth,	28 00
Sandwich,	65 00		
Scituate,	57 70		
			<hr/>
			\$9,179 32

APPENDIX C.

SHOWING THE HIGHWAYS LAID OUT OR CONTRACTED FOR BY THE MASSACHUSETTS HIGHWAY COMMISSION AND CONSTRUCTION EXPENDITURES TO DEC. 1, 1916.

TOWN OR CITY.	Year.	ROADS LAID OUT.			Length constructed to Dec. 1, 1916.
		From —	Direction.	Length (Miles).	
Abington,	1900-1-3,	Brockton line,	Easterly,	1.73	1.74
Abington,	1905-7,	Holbrook line,	Easterly,	1.64	1.64
Abington,	1911,	Weymouth line,	Southerly,	1.95	1.95
Abington,	1913-15,	Whitman line,	Northerly,	1.61	1.61
Acton (Great Road), ¹	1899-1900-1-2,	Concord line to Littleton line,	Northwesterly,	3.71	3.71
Acton (Harvard Pike),	1901-7-12-13,	Boxborough line to Concord line,	Easterly,	3.97	3.97
Acushnet,	1901-3,	Rochester line to Rochester line via Long Plain,	Westerly and northerly,	2.80	2.80
Acushnet,	1897,	New Bedford line,	Northerly, . . . . .	.61	.61
Adams (Maple Grove),	1897,	Cheshire line,	Northerly, . . . . .	.57	.57
Adams (Orchard Street),	1908,	Cheshire line,	Northerly,	1.46	1.46
Agawam,	1903-4-6-7-9-11,	South end bridge to Connecticut line,	Southerly,	3.99	3.99
Amesbury,	1899-1901-3-4,	Merrimac line,	Easterly,	2.25	2.25
Amherst,	1906-7-12,	Salisbury line,	Westerly,	1.05	1.05
Amherst,	1901-4,	Hadley line,	Northeasterly, . . . . .	.97	.97
Amherst,	1913,	Pleasant Street,	Northerly, . . . . .	.80	.80
Andover,	1895-6,	South Hadley line,	Northerly,	2.30	2.00
Andover,	1897-9-1900-2-3,	Lawrence line,	Southerly,	1.22	1.22
Arlington,	1916,	North Reading line,	Northerly,	2.97	2.97
Ashburnham, ²	1911,	Lexington line to Brattle Street,	Southeasterly,	1.30	.67
Ashburnham, ²	1916,	New Hampshire State line,	Southeasterly, . . . . .	.67	1.70
Ashburnham, ²	1916,	Westminster line,	Northwesterly,	3.78	3.78
Ashby,	1894-5-6-7-8-9,	Winchendon line,	Southeasterly,	3.57	3.57
Ashby,	1910-11-12,	Fitchburg line to Ashby post office,	Northerly,	1.52	1.52
Ashfield,	1897-8,	Townsend line,	Southwesterly,	1.61	1.61
Ashfield,	1897-8,	One mile north of Ashfield post office,	Northerly, . . . . .	. . .	. . .

SHOWING THE HIGHWAYS LAID OUT OR CONTRACTED FOR BY THE MASSACHUSETTS HIGHWAY COMMISSION, ETC. — *Continued.*

TOWN OR CITY.	Year.	ROADS LAID OUT.			Length constructed to Dec. 1, 1916.
		From —	Direction.	Length (Miles).	
Boston.	1908.	Dedham line to Lagrange Street.	Northeasterly.	1.40	\$133,592 53
Bourne.	1897-8-1904-14-15.	Cohasset Narrows to Canal bridge.	Easterly.	5.36	5.36
Bourne, ¹	1903-5-7-10-11.	Back River bridge.	Falmouth line.	5.30	74,535 37
Bourne.	1913-14-15.	Plymouth line to Canal bridge.	Southeasterly.	2.24	2.24
Boxborough.	1897-9-1905-7.	Aetion line to Harvard line.	Northwesterly.	3.31	20,568 34
Braintree.	1900-2.	Via Quincy Avenue to Fore River.	Southeasterly.	1.06	27,292 51
Brantree.	1915.	Holbrook line.	Northerly.	1.41	1.41
Brewster.	1895-6-7-1901.	Dennis line to Orleans line.	Easterly.	7.78	7.78
Brewster.	1908.	Orleans line to Chatham line.	Southerly.	.04	31,068 00
Bridgewater.	1904-5-6-7-8.	Taunton River.	Northwesterly.	3.47	25,587 67
Bridgewater.	1916.	East Bridgewater line.	Southerly.	1.08	24,918 21
Brimfield.	1897-9.	Monson line.	Southerly.	2.34	2.34
Brimfield.	1901-2.	Wales line.	Northerly.	1.63	1.63
Brockton.	1897-8-9.	Easton line.	Easterly.	1.87	1.87
Brockton.	1900.	Abington line.	Westerly.	.66	.66
Brockton.	1904.	West Bridgewater line.	Northerly.	.66	31,608 64
Brockton.	1914.	Stoughton line.	Southeasterly.	.60	.60
Brockfield.	1897-8-1900-2-3-4.	West Brookfield line to Brookfield village.	Easterly.	3.12	54,612 93
Brockfield.	1905-7.	Spencer line.	Southwesterly.	.77	.77
Brockfield.	1912.	North Brookfield line to railroad.	Southerly.	.74	.74
Buckland.	1894-5-6-7-8-9-1900-3-7.	Shelburne Falls station.	Westerly and southerly.	4.28	4.28
Burlington.	1913.	Scotts bridge.	Southeasterly.	.02	67,043 07
Burlington.	1903-4-5-6.	Woburn line to Billerica line.	Northwesterly.	3.80	34,809 50
Canton.	1905-6-7-8.	Stoughton line.	Northerly.	3.23	25,555 28
Charlemont.	1897-8-9-13-15.	Deerfield River bridge.	Easterly and southerly.	7.25	7.25
Charlemont.	1912-13-14-15.	Scotts bridge.	Northwesterly.	.30	126,953 07
Charlemont.	1916.	Connecting above sections.	—	4.35	4.35
Charlton.	1901-2.	Charlton Depot to Charlton City.	Southerly.	1.91	96,163 99
Charlton.	1905-6-7-10-11-12.	Oxford line to Charlton City.	Southwesterly.	4.84	4.84
Charlton.	1909-13-14-15.	Southbridge line to Charlton City.	Northerly.	3.06	3.06
Chatham.	1899-1901-2-5-6.	Depot Street to Harwich line.	Westerly.	4.04	4.04
Chatham.	1907.	Depot Street to Harwich line.	Northwesterly.	3.13	45,859 01

SHOWING THE HIGHWAYS LAID OUT OR CONTRACTED FOR BY THE MASSACHUSETTS HIGHWAY COMMISSION, ETC. — *Continued.*

TOWN OR CITY.	Year.	ROADS LAID OUT.			Length constructed (Miles).	Length constructed (Miles).	Construction Expenditures to Dec. 1, 1916.
		From —	Direction.				
Dudley.	1902-4-6-7.	Near Webster line.	Southwesterly.		2.29	2.29	\$39,029 68
Dudley.	1916.	Southerly end of 1907 section to Connecticut line.	Southwesterly.		.89	.72	
Duxbury.	1894-5-7-9-1903-5-8-9.	Marshfield line to Kingston line.	Southerly.		5.16	5.16	58,781 35
Duxbury.	1914-15.	Pembroke line to Kingston line.	Southwesterly.		3.76	3.76	27,732 67
Duxbury.	1903-4-5-6-9.	Wellfleet line to Orleans line.	Southerly.		6.46	6.46	
Duxbury.	1895-6.	Northampton line.	Southwesterly.		1.32	1.32	
Duxbury.	1900-1.	Mount Tom at Clark Street.	Northerly.		1.10	1.10	27,552 17
Duxbury.	1913.	Holyoke line.	Northerly.		.35	.35	
Duxbury.	1916.	Bridgewater line.	Northerly.		.50	.20	3,551 70
Duxbury.	1916.	Central Square.	Northerly.		1.07	1.15	19,867 65
Duxbury.	1904-6-10.	Springfield line to village.	Southwesterly.		1.80	1.80	4,367 93
Duxbury.	1900.	Brookton line.	Southwesterly.		2.42	2.42	17,478 26
Duxbury.	1897-9-1900-1-2-3.	Oak Bluffs line.	Southerly.		2.24	2.24	1,411 82
Duxbury.	1915.	New York line.	Southwesterly.		2.86	2.86	77,094 88
Duxbury.	1898-9-1900-11-12.	Orange line.	Northwesterly.		5.26	5.26	
Duxbury.	1907-9-10-14.	Millers Falls to Irving village.	Easterly.		.35	.35	25,630 77
Duxbury.	1902-3.	Essex River.	Easterly and westerly.		1.11	1.11	14,366 53
Duxbury.	1894-5.	Gloucester line.	Westerly.		1.45	1.45	
Duxbury.	1916.	Mattapoisett line.	Westerly.		.55	.55	
Duxbury.	1915.	End of 1895 section.	Westerly.		.03	.03	122 03
Duxbury.	1904.	Brightman Street bridge approach.	—		—	—	
Duxbury.	1905-6-7-8-9-10.	Bourne line to Woods Hole.	Southerly.		11.66	11.66	41,938 46
Duxbury.	1894-5.	East Falmouth to Waquoit.	Easterly.		3.90	3.90	
Duxbury.	1897.	Westminster line.	Easterly.		.97	.97	51,174 17
Duxbury.	1900-1-3-4.	Lunenburg line.	Westerly.		.60	.60	
Duxbury.	1913.	Asby line.	Westerly.		2.55	2.55	
Duxbury.	1914.	Savoy line.	Pasterly.		.03	.03	19,652 51
Duxbury.	1901-2.	North Adams line.	Southwesterly.		7.21	7.21	19,537 02
Duxbury.	1905-8.	Mansfield line.	Northerly.		1.81	1.81	
Duxbury.	1904-5.	Wrentham line.	Southwesterly.		1.70	1.70	
Duxbury.	1910.	Southborough line. Pleasant Street.	Southwesterly.		2.42	2.42	17,261 67
Duxbury.	1910.	Ashland line, Hollis Street.	Northerly.		.79	.79	

Franklin,	1905-7-10,	Bellingham line,	Northeasterly,	2.58	29,713 89
Franklin,	1911,	Wrentham line,	Northwesterly,	1.18	18,524 71
Freetown,	1902-3,	New Bedford line to Lakeville line,	Northerly,	3.19	44,546 24
Freetown,	1908,	Fall River line to Assonet,	Northeasterly,	.68	24,779 41
Gardner,	1897-8,	Templeton line,	Easterly,	2.38	4,522 20
Gardner,	1900-1,	Westminster line,	Northwesterly,	.98	110,614 97
Gay Head,	1913,	Chilmark line,	Northwesterly,	3.14	46,440 20
Gill,	1912,	Barnardston line to Northfield line,	Easterly,	.28	83,497 29
Gloucester,	1894-5-8-1905-6-7,	Manchester line to "Cut bridge,"	Northerly,	3.46	80,139 81
Gloucester,	1907,	Rockport line,	Northerly,	3.45	53,581 36
Gloucester,	1916,	Essex line,	Southerly,	.52	73,517 76
Gloucester,	1916,	End of 1915 section,	Easterly,	1.00	33,183 20
Goshen,	1894-5-8,	Williamburg line,	Easterly,	1.76	51,962 06
Grafton,	1897-9-1900-5-12-13-14-15,	Milliamsburg line,	Northwesterly,	2.46	9,083 95
Grafton,	1894-1902-5-6-8,	South Hadley line,	Southerly and southeasterly,	6.50	6,258 20
Granby,	1911-13-14,	North Street to Belchertown line,	Easterly,	2.26	29,861 41
Granby,	1915,	South Hadley line to Amherst line,	Northeasterly,	3.21	33,736 23
Granby,	1894-6-7-1902,	Housatonic River bridge,	Northeasterly,	2.03	52,159 94
Great Barrington,	1916,	Point on Monument Mountain Road,	Easterly,	3.41	83,475 14
Great Barrington,	1899-1900-2,	Washington Street,	Southwesterly,	.75	17,561 43
Greenfield,	1903-6-7-8-10-14,	Barnardston line,	Easterly,	1.42	
Greenfield,	1905,	Point on Colrain Road,	Southwesterly,	3.77	
Greenfield,	1901-2-7,	Pepperell line,	Northerly,	.26	
Groton,	1914,	Pepperell line,	Southwesterly,	1.41	
Groveland,	1900-1-2-5,	Merrimac River bridge to West Newbury line,	Northeasterly,	.11	
Hadley,	1894-1904,	Connecticut River to Amherst line,	Northwesterly,	1.72	
Hamilton,	1899-1900,	Ipswich line,	Easterly,	4.69	
Hamilton,	1909-10,	Wenham line,	Southwesterly,	1.44	
Hamilton,	1916,	End of 1899 section,	Northeasterly,	1.22	
Hancock,	1895-6-8-9,	Pittsfield line to New York State line,	Southwesterly,	.44	
Hanover,	1906-8,	Pembroke line,	Westerly,	3.23	
Hanover,	1897-1901,	New Braintree line,	Northwesterly,	1.85	
Harvard,	1900-5-10,	Boxborough line to Harvard Common,	Northerly,	.82	
Harwich,	1899-1900-1-2-3,	Dennis line to Chatham line,	Westerly,	2.31	
Harwich,	1908,	Chatham line to Brewster line,	Easterly,	5.10	
Hathfield,	1901-6-8-9-10-11,	Northampton line to Whately line,	Northerly,	1.38	
Haverhill,	1902-7-10,	Kenoza Road to Merrimac line,	Northerly,	3.54	
Haverhill,	1899,	River and Maxwellstreets to Methuen line,	Easterly,	2.66	
Haverhill,	1912,	North Andover line,	Westerly,	2.63	
Hingham,	1894,	Weymouth Back River,	Northeasterly,	.43	
Hingham,	1896-7,	Near Cohasset line,	Easterly,	1.42	
Hingham,	1916,	Cohasset line,	Westerly,	1.24	
			Westerly,	.05	

1 Exclusive of 49.5 feet at railroad bridge.

² Exclusive of 1,000 feet at railroad crossing.

SHOWING THE HIGHWAYS LAID OUT OR CONTRACTED FOR BY THE MASSACHUSETTS HIGHWAY COMMISSION, ETC. — *Continued.*

TOWN OR CITY.	Year.	ROADS LAID OUT.			Length constructed (Miles).	Construction Expenditures to Dec. 1, 1916.
		From —	Direction.	Length (Miles).		
Hinsdale,	1901-2-3,	Dalton line.	Southeasterly,	1.02	1.02	\$13,495 68
Holbrook,	1894-6-1902,	Weymouth line,	Northwesterly,	1.75	1.75	15,373 19
Holden,	1898-1900-5-8-15,	Worcester line to Rutland line,	Northwesterly and easterly,	6.95	6.95	72,172 29
Holliston,	1906-7-10,	Milford line,	Northeasterly,	3.32	3.32	45,213 45
Holliston,	1911-12,	Ashland line,	Southerly,	1.61	1.61	
Holyoke,	1905-6-10,	Easthampton line,	Southerly,	4.17	4.17	22,649 41
Hudson,	1906-7,	Brigham Street to Marlborough line,	Southerly,	1.14	1.14	8,142 03
Huntington,	1895-6,	Russell line,	Westerly,	1.01	1.01	
Huntington,	1903-6-9,	Chester line,	Southeasterly,	1.25	1.25	28,076 28
Ipswich,	1907-8-9,	Hamilton line to Ipswich Common,	Northerly,	2.13	2.13	40,024 03
Ipswich, ¹	1910-11,	Rowley line,	Southerly,	2.29	2.29	
Kingston,	1905-6,	Duxbury line (Tremont Street),	Southerly,	1.02	1.02	7,394 74
Kingston,	1916,	Duxbury line (Summer Street),	Southeasterly, . . . . .	.81	.81	56,005 53
Lakeville,	1901-2,	Near Middleborough line,	Southwesterly,	3.57	3.57	7,342 74
Lakeville,	1910-11-12,	Freetown line to Berkley line,	Northwesterly,	4.79	4.79	25,192 42
Lancaster, ²	1902,	Clinton line to Sterling line,	Northerly,	1.25	1.25	18,485 36
Lancaster, ³	1911-12-13,	Cheshire line to Pittsfield line,	Northerly,	2.29	2.29	
Lawrence,	1896,	Methuen line (Jackson Street),	Northerly, . . . . .	.27	.27	
Lawrence,	1915,	Methuen line,	Southwesterly, . . . . .	.54	.54	
Lee,	1894-5-6-1908-9-12-13,	Lee Park to Becket line,	Easterly and southeasterly,	5.14	5.14	167,486 48
Lee,	1900,	Lenox line to Lee village,	Southerly,	1.26	1.26	
Lee,	1906,	Lenox line to Stockbridge Street,	Southerly,	1.03	1.03	
Lee (south),	1906-15,	Stockbridge line to Main Street,	Northeasterly,	3.28	3.28	
Leicester, ⁴	1904-5-6-8-9,	Worcester line to Spencer line,	Westerly,	4.87	4.87	67,162 98
Lenox,	1899-1900-1,	Lee line to Lenox village, Walker Street,	Northerly,	2.28	2.28	
Lenox,	1904-5,	Pittsfield line to Lenox village,	Southerly,	3.18	3.18	39,154 59
Lenox,	1906,	Lee line to Lenox village, Kemble Street,	Northerly,	2.20	2.20	
Leominster,	1901-2-15,	Sterling line,	Northerly,	2.55	2.55	31,192 99
Lexington,	1895-6-7-8,	Massachusetts Avenue,	Westerly,	3.44	3.44	
Lexington,	1900,	Bedford line,	Southeasterly, . . . . .	.85	.85	38,448 04
Lexington,	1916,	Arlington line,	Northwesterly, . . . . .	.33	.33	
Lincoln,	1895-6-7,	Lexington line to Concord line,	Northwesterly,	2.06	2.06	16,883 77

SHOWING THE HIGHWAYS LAID OUT OR CONTRACTED FOR BY THE MASSACHUSETTS HIGHWAY COMMISSION, ETC. — *Continued.*

TOWN OR CITY.	Year.	ROADS LAID OUT.			Length constructed (Miles).	Construction Expenditures to Dec. 1, 1916.
		From —	Direction.	Length (Miles).		
Milton, ¹	1899-1900,	Neponset River, Granite bridge.	Southeasterly,	.87	.87	\$11,344 26
Monson,	1894,	Railroad bridge toward Palmer,	Northerly,	.93	.93	
Monson,	1901-5,	Palmer line to Brimfield line,	Southeasterly,	.39	.39	16,180 94
Monson,	1908,	Palmer line,	Easterly and westerly,	.29	.29	
Montague,	1905-9,	Connecticut River bridge,	Northeasterly,	1.68	1.68	52,149 51
Montague,	1898-9-1904-6-10,	Third Street, near I. Street, Turners Falls,	Easterly,	4.05	4.05	
Nantucket,	1894-1903,	First milestone, Siasconset,	Easterly,	6.48	6.48	52,893 84
Natick,	1901,	Wellesley line to Lincoln Square,	Westerly,	1.14	1.14	21,575 15
Natick,	1903,	Sherborn line to Cemetery Street,	Pasterly,	2.06	2.06	
Needham,	1901,	Newton line,	Westerly,	1.00	1.00	11,213 34
Needham,	1905,	Charles River bridge, Chestnut Street,	Northerly,	1.03	1.03	
New Braintree,	1897,	Hardwick line to Ware line,	Southerly,	.17	.17	3,944 07
New Braintree,	1903,	New Braintree village,	Northerly,	.23	.23	33,546 85
Newbury,	1899-1906,	Newburyport line to Rowley line,	Southerly and southwesterly,	4.23	4.23	
Newburyport,	1896-7-8,	West Newbury line,	Easterly,	1.75	1.75	15,708 26
Newburyport,	1913,	Bridge Street to River bridge,	Northerly,	.09	.09	
Newton,	1901,	Needham line,	Pasterly,	1.03	1.03	6,554 87
Norfolk,	1895,	Walpole line to Wrentham line,	Southwesterly,	1.45	1.45	16,602 60
North Adams,	1894-6-7,	Williamstown line,	Pasterly,	2.13	2.13	
North Adams,	1900-1-2-3,	Ashland Street bridge to Adams line,	Southerly,	2.35	2.35	
North Adams,	1913,	Boundary between North Adams and Florida.	Northerly,	3.65	3.65	50,914 87
North Andover,	1900-2-4,	Lawrence line,	Southeasterly,	1.90	1.90	
North Andover,	1907-10-11-12,	Osgood Park, Pleasant and Court streets to the Haverhill line.	Northerly,	3.71	3.71	170,784 45
North Andover,	1913-14-15,	Andover Street,	Southeasterly,	3.79	3.79	
Northampton,	1894,	End of 1915 section to Middleton line,	Southeasterly,	1.21	1.00	
Northampton,	1897-8-9-1900-5,	Hadley bridge,	Southwesterly,	.56	.56	
Northampton,	1912,	Easthampton line, River Road,	Northeasterly,	1.47	1.47	131,393 24
Northampton,	1912-15,	Easthampton line, River Road,	Northerly,	1.42	1.42	
Northampton,	1912-15,	Hatfield line, Laurel Park Road,	Southwesterly and southerly,	2.18	2.18	

SHOWING THE HIGHWAYS LAID OUT OR CONTRACTED FOR BY THE MASSACHUSETTS HIGHWAY COMMISSION, ETC. — *Continued.*

TOWN OR CITY.	Year.	ROADS LAID OUT.			Length con- structed (Miles).	Construc- tion Ex- penditures to Dec. 1, 1916.
		From —	Direction.	Length (Miles).		
Princeton.	1897-1900-2-3.	Princeton depot.	Easterly.	2.23	2.23	\$21,927 60
Provincetown.	1901-3.	Truro line to Allerton Street.	Westerly.	1.10	1.10	12,920 95
Provincetown.	1916.	State Highway to Race Point.	Northerly.	2.53	2.00	
Quincy.	1899.	Chubbuck Street to Fore River bridge.	Southeasterly.	.49	.49	26,587 83
Quincy.	1902-9.	Braintree line.	Northerly.	.95	.95	
Quincy.	1904.	Randolph line to Milton line.	Northerly.	1.23	1.23	
Randolph.	1902-3-9.	Quincy line.	Northerly.	1.90	1.90	
Randolph.	1915.	Avon line.	Southeasterly.	1.81	1.81	49,055 08
Raynham.	1901-2-3.	Taunton line, Dean Street.	Northeasterly.	1.48	1.48	
Raynham.	1912-13.	Southerly end of Hockamock swamp.	Southerly and southwesterly.	2.68	2.68	52,770 19
Raynham.	1915.	Taunton line.	Northerly.	1.50	1.50	
Reading.	1899-1900-15.	Stoneham line.	Northerly.	1.26	1.26	30,986 34
Reading.	1902-3.	North Reading line.	Southerly.	2.67	2.67	
Rehoboth.	1895-1908.	Seekonk line to Dighton line.	Easterly.	6.03	6.03	59,608 98
Rehoboth.	1912.	Swansea line to Seekonk line.	Northeasterly.	.51	.58	
Revere.	1897-8.	Boston line.	Northeasterly.	1.11	1.11	152,427 66
Revere.	1899-1913.	Saugus line.	Southwesterly.	2.06	2.06	
Revere.	1913.	Point of Pines to Revere Street.	Southerly.	1.31	1.31	
Revere.	1916.	Revere Street.	Northerly.	4.02	4.02	
Richmond.	1897-1907.	Railroad station to Pittsfield line.	Northerly.	5.27	5.27	6,674 70
Rochester.	1903.	Marion line to Acushnet line.	Westerly.	.90	.90	
Rochester.	1909.	Middleborough line to Wareham line.	Southeasterly.	2.35	2.35	13,493 55
Rockland.	1902-5-6.	Abington line to Hanover line.	Easterly.	1.60	1.60	21,061 52
Rockport.	1902-6-10.	Gloucester line.	Northerly.	2.90	2.90	22,160 03
Rowley.	1905-7-8-9.	Newbury line.	Southwesterly.	.74	.74	
Russell.	1911.	Ipswich line.	Northerly.	6.68	6.68	15,291 98
Russell.	1894-5-6-7-8-9-1916.	Westfield line to Huntington line.	Northeasterly.	1.16	1.16	8,981 39
Rutland.	1904.	Holden line.	Northwesterly.	1.40	1.40	
Salem.	1901-9.	Swampscott line.	Northeasterly.	1.91	1.91	46,868 70
Salem.	1914.	Lynn line.	Northeasterly.	1.91	1.91	

Salisbury,	.	.	.	.	.	Salisbury village to Newburyport bridge,	Southerly,	1.56	1.56
Salisbury,	.	.	.	.	.	New Hampshire line to village,	Southerly,	2.41	2.41
Salisbury,	.	.	.	.	.	Amesbury line,	Southeasterly,	1.74	1.74
Salisbury,	.	.	.	.	.	Salisbury Square to Salisbury Beach,	Southeasterly,	2.17	2.17
Salisbury,	.	.	.	.	.	Broadway to New Hampshire line,	Northerly,	2.02	2.02
Sandwich,	.	.	.	.	.	Barnstable line to Bourne line,	Westerly and northwesterly,	7.13	7.13
Sandwich,	.	.	.	.	.	Mashpee line to Barnstable line,	Southeasterly,	.11	.11
Saugus,	.	.	.	.	.	Foxhill Bridge to Revere line,	Southeasterly,	1.04	1.04
Saugus,	.	.	.	.	.	Melrose line to Newburyport turnpike,	Southeasterly,	.86	.86
Savoy,	.	.	.	.	.	Florida and Savoy at Cold River,	Southerly,	.04	.04
Savoy,	.	.	.	.	.	Florida line to Charlemon line,	—	—	—
Savoy,	.	.	.	.	.	Cohasset line to Marshfield line,	Southerly,	1.76	1.76
Seakonk,	.	.	.	.	.	Rehoboth line to Rhode Island line,	Westerly,	5.37	5.37
Seakonk,	.	.	.	.	.	Perry Avenue to Rehoboth line,	Southeasterly,	2.76	2.76
Seakonk,	.	.	.	.	.	Foxborough line,	Southeasterly,	3.27	3.27
Sharon,	.	.	.	.	.	Connecticut line via under Mountain Road,	Northeasterly,	.64	.64
Sheffield,	.	.	.	.	.	Connecticut line via Ashley Falls Road,	Northeasterly and northerly,	5.15	5.15
Sheffield,	.	.	.	.	.	Bridge Street to Colrain line,	Northerly,	2.10	2.10
Shelburne,	.	.	.	.	.	Bridge Street,	Northeasterly,	2.16	2.16
Shelburne,	.	.	.	.	.	Ayer line to Lunenburg line,	Northeasterly,	4.42	4.42
Shirley,	.	.	.	.	.	Worcester line to Northborough line,	Westerly,	3.62	3.62
Shrewsbury,	.	.	.	.	.	Slades Ferry bridge,	Northeasterly,	4.86	4.86
Somerset,	.	.	.	.	.	Slades Ferry bridge to Swansea line,	Northerly,	5.38	5.38
Somerset,	.	.	.	.	.	Slades Ferry bridge, Brayton Avenue,	Northeasterly,	2.40	2.40
Somerset,	.	.	.	.	.	Junction of Riverside and Brayton avenues to Swansea line,	Northerly,	.28	.28
Somerville,	.	.	.	.	.	Medford line via Mystic Avenue,	Westerly and northwesterly,	1.85	1.85
Somerville,	.	.	.	.	.	Junction of Middlesex and Mystic avenues to Fellsyway Boulevard,	Southeasterly,	1.16	1.16
Southampton,	.	.	.	.	.	Easthampton line,	Northerly,	.42	.42
Southborough,	.	.	.	.	.	Westborough line,	Southerly,	.71	.71
Southborough,	.	.	.	.	.	Ashland line,	Easterly,	1.89	1.89
Southborough,	.	.	.	.	.	Frammingham line,	Westerly,	.65	.65
Southbridge,	.	.	.	.	.	Charlton line,	Southwesterly,	1.15	1.15
Southbridge,	.	.	.	.	.	Sturbridge line,	Southwesterly,	.91	.91
South Hadley,	.	.	.	.	.	Granby line to South Hadley Falls,	Easterly,	.45	.45
South Hadley,	.	.	.	.	.	South Hadley Falls to Granby line,	Southwesterly,	2.42	2.42
South Hadley,	.	.	.	.	.	Amherst line to Granby line,	Northeasterly,	4.64	4.64
Spencer,	.	.	.	.	.	Leteser line,	Southerly,	.31	.31
Spencer,	.	.	.	.	.	Brookfield line to Seven Mile River bridge,	Westerly,	1.60	1.60
Spencer,	.	.	.	.	.		Easterly,	1.46	1.46

SHOWING THE HIGHWAYS LAID OUT OR CONTRACTED FOR BY THE MASSACHUSETTS HIGHWAY COMMISSION, ETC. — *Concluded.*

TOWN OR CITY.	Year.	ROADS LAID OUT.				Length constructed to Dec. 1, 1916.
		From —	Direction.	Length (Miles).	Length constructed (Miles).	
Westfield,	1894-6-8-9,	West Springfield line,	Westerly,	2.22	2.22	\$46,019 84
Westfield,	1898-9-1900-1-2,	Russell line,	Easterly,	3.59	3.59	
Westford,	1902-12,	Littleton line to Chelmsford line,	Northerly and southwesterly,	4.15	4.15	14,422 98
Westford,	1903,	Minot's Corner to Westford village,	Northerly, . . . . .	.80	.80	
Westminster,	1894-5-6-7-8-9,	Fitchburg line,	Southwesterly,	3.00	3.00	55,579 40
Westminster,	1903,	Gardner line,	Easterly,	2.25	2.25	
Westminster,	1915,	Fitchburg line to Ashburnham line,	Northwesterly,	2.27	2.27	
West Newbury,	1895-6-7-1903-4-5-6-9,	Newburyport line to Groveland line,	Westerly,	5.09	5.09	58,726 45
Weston,	1898-9,	Wayland line to near Stony Brook,	Easterly,	3.15	3.15	16,212 44
Westport, ¹	1894-6-7-8-1913,	Dartmouth line,	Westerly and southeasterly,	4.45	4.45	46,429 60
West Springfield,	1895-6-1905-6-12-13,	Westfield line,	Easterly,	3.07	3.07	32,944 46
West Tisbury,	1895-6-7-1904,	Tisbury line to Chilmark line,	Southwesterly,	5.35	5.35	38,084 55
Westwood,	1899-1900-13-16,	Norwood line to Dedham line,	Northerly,	1.08	1.08	8,080 05
Weymouth,	1894,	Holbrook line to Abington line,	Easterly, . . . . .	.25	.25	
Weymouth,	1895-6-7,	Fore River to Back River,	Easterly,	1.75	1.75	
Weymouth,	1903-4-7-8-10,	Broad Street via Washington to Abington line	Southerly,	4.94	4.94	63,610 18
Weymouth,	1915,	Hingham line,	Northwesterly,	2.15	2.15	39,068 04
Whately, ²	1899-1901-2-3-4-5-6,	Deerfield line to Hatfield line,	Southerly,	4.03	4.03	42,303 64
Whitman,	1894-5-6,	Brookline line,	Easterly,	1.70	1.70	54,965 86
Whitman,	1913-14,	East Bridgewater line to Abington line,	Northerly,	2.30	2.30	34,688 22
Williamburg,	1894-5-6-1901-3-4-13,	Springfield line to Palmer line,	Easterly,	5.07	5.07	
Williamstown,	1896-8-1901-3,	Goshen line,	Southwesterly,	2.65	2.65	
Williamstown,	1916,	Bridge,	—	.03	.03	
Williamstown,	1907,	River Road from village,	Southerly, . . . . .	.13	.13	35,104 72
Williamstown, ³	1895-6-8-1903,	North Adams line,	Westerly,	1.48	1.48	37,946 52
Winchendon,	1907-8-10-11,	Tewksbury line,	Southerly,	3.68	3.68	9,928 91
Winchendon,	1907,	Glen Allen Road via Maple Street,	Southwesterly,	1.35	1.35	
Winchendon, ⁴	1907,	Miller's River bridge, River Street,	Southwesterly, . . . . .	.35	.35	
Winchendon,	1916,	Ashburnham line,	Northwesterly,	3.15	3.15	

Station	Year	Line	Direction	Distance (miles)	Speed (m.p.h.)	Time (hours)
Winchester	1899-1900	Arlington line to Woburn line	Northeasterly	1.96	1.96	15,475 81
Windsor	1897-1902	Cummington line	Westerly	4.88	4.88	49,549 16
Woburn	1900-1-2	Winchester line to Burlington line	Northwesterly	2.03	2.03	
Woburn	1912	Wilmington line	Southwesterly	.58	.58	
Woburn	1913	North Main and Elm streets	Southerly	.40	.40	
Woburn	1915	Lexington line	Northeasterly	.99	.99	34,390 09
Woburn	1916	End of 1915 section	Northeasterly	1.01	1.01	
Worcester	1896-7	Paxton line	Southeasterly	1.35	1.35	
Worcester	1897-1903	Holden line	Southeasterly	1.50	1.50	47,329 14
Worcester	1900-5	West Boylston line	Southerly	1.22	1.22	
Wrentham	1897-8-9-1900-2-14	Pianville line to Norfolk line	Northerly	4.94	4.94	
Wrentham	1912-13	Franklin line	Southeasterly	2.04	2.04	93,905 72
Wrentham	1915	Foxborough line	Southwesterly	2.55	2.55	
Yarmouth (north)	1894-5-6	Barnstable line to Dennis	Easterly	3.70	3.70	38,112 18
Yarmouth (south)	1895-6-7	Barnstable line to Bass River bridge	Easterly	5.09	5.09	

¹ See Dartmouth.

2 Exclusive of 375 feet at railroad crossing and 800 feet at railroad bridge.

³ Exclusive of 300 feet at railroad bridge.

4 Exclusive of bridges.

APPENDIX D.

TABLE SHOWING TOWNS AND CITIES IN WHICH WORK HAS BEEN DONE DURING THE YEAR 1916, AND RESIDENT ENGINEERS ON SUCH WORK, TOGETHER WITH DATES OF BEGINNING AND ENDING.

Town or City.	County.	Year.	Resident Engineer.	Date of Contract.	Date of Beginning, 1916.	Date of Ending, 1916.
Abington,	Plymouth,	Surfacing,	M. J. Dalton,	April 11, 1916	May 15	June 26
Andover,	Essex,	Surfacing,	Frank A. Chase,	April 18, 1916	July 22	Dec. 4
Arlington,	Middlesex,	1916,	Francis T. McAvoy,	Sept. 12, 1916	Sept. 30	Dec. 31
Ashburnham,	Worcester,	1916,	E. N. Briggs,	Sept. 12, 1916	Sept. 23	Dec. 15
Ashby,	Middlesex,	Surfacing,	E. N. Briggs,	April 11, 1916	April 26	Oct. 7
Barnstable,	Barnstable,	1915,	C. R. Mosher,	Dec. 21, 1915	May 1	July 15
Barnstable,	Barnstable,	1915,	E. F. Coleman,	Dec. 21, 1915	July 17	Oct. 7
Barnstable,	Barnstable,	1915,	H. C. Holden,	Dec. 21, 1915	Oct. 9	Nov. 27
Barnstable,	Barnstable,	Surfacing,	Grover C. Coffin,	April 18, 1916	May 16	July 21
Barnstable,	Barnstable,	1916	E. A. Armingtton,	May 23, 1916	June 12	Dec. 16
Barre,	Worcester,	Chapter 221,	A. W. Huseford,	Sept. 14, 1915	April 10	Sept. 20
Barre,	Worcester,	Surfacing,	A. W. Huseford,	April 26, 1916	May 19	Aug. 9
Belchertown,	Hampshire,	Chapter 221,	Rubeen Barker,	Sept. 27, 1916	Sept. 14	Oct. 15
Belchertown,	Hampshire,	Chapter 221,	Wm. J. Hurley,	Sept. 27, 1916	Oct. 15	Dec. 19
Bourne,	Barnstable,	1916,	H. C. Holden,	Sept. 26, 1916	Oct. 16	Dec. 28
Bourne,	Barnstable,	1916,	Grover C. Coffin,	Sept. 26, 1916	Oct. 30	Dec. 16
Charlemont,	Franklin,	1915,	C. B. Raymond,	Oct. 31, 1915	April 3	Dec. 8
Chelmsford,	Middlesex,	Surfacing,	E. J. Dahill,	Nov. 4, 1915	June 10	Aug. 5
Chelmsford,	Berkshire,	Chapter 525,	Ed. F. Morgan, Jr.,	Nov. 4, 1915	April 29	Aug. 18
Clarksburg,	Berkshire,	Bridge,	Austin E. Page,	May 17, 1916	June 5	June 10
Clarksburg,	Berkshire,	Bridge,	H. B. Andrews,	May 17, 1916	June 5	June 28
Dartmouth,	Bristol,	Surfacing,	R. A. Vesper,	July 5, 1916	July 25	Nov. 1
Deedham,	Norfolk,	1915,	E. J. Dahill,	Oct. 20, 1915	April 12	May 31
Deerfield,	Franklin,	Chapter 221,	Carl H. Morrill,	Sept. 15, 1915	April 10	May 15
Dennis,	Barnstable,	Surfacing,	C. R. Mosher,	April 18, 1916	May 17	July 23
Dennis,	Barnstable,	Surfacing,	Grover C. Coffin,	April 18, 1916	May 17	Sept. 14
Dennis,	Barnstable,	Surfacing,	C. R. Mosher,	April 18, 1916	Sept. 25	Oct. 14
Dighton,	Bristol,	Surfacing,	H. O. Parker,	April 11, 1916	May 1	July 6

Dudley.	Worcester.	1916.	Norman R. Clark,	July 11, 1916	Aug. 21	Dec. 9
Duxbury.	Plymouth.	Surfacing.	M. J. Dalton,	June 23, 1916	July 24	Dec. 15
East Bridgewater.	Plymouth.	1916.	P. M. Churchill,	Sept. 20, 1916	Oct. 13	Nov. 11
East Bridgewater.	Plymouth.	1916.	E. F. Coleman,	Sept. 20, 1916	Nov. 13	Dec. 19
Edgartown.	Dukes.	Bridge.	H. C. Holden,	Nov. 4, 1915	Jan. 1	Mar. 7
Free town.	Bristol.	1916.	H. O. Parker,	Oct. 24, 1916	Nov. 6	Nov. 11
Free town.	Bristol.	1916.	Anthony Weldon,	Oct. 24, 1916	Nov. 13	Dec. 9
Gloucester.	Essex.	1915.	R. W. Coburn,	Dec. 8, 1915	Jan. 1	Feb. 19
Gloucester.	Essex.	1915.	A. P. Rice,	Dec. 8, 1915	Jan. 1	Feb. 19
Gloucester.	Essex.	Surfacing.	Henry D. Fallon,	April 12, 1916	April 3	Dec. 14
Gloucester.	Essex.	1916.	J. E. Lawrence,	April 12, 1916	June 20	June 3
Grafton.	Worcester.	Chapter 221.	Arthur P. Rice,	Oct. 10, 1915	Oct. 20	Oct. 5
Grafton.	Worcester.	Chapter 221.	Samuel Hobbs,	Oct. 10, 1915	Jan. 1	Feb. 19
Grafton.	Worcester.	Chapter 221.	Earle O. Turner,	Oct. 18, 1915	Feb. 21	April 7
Grafton.	Worcester.	Chapter 221.	E. W. Harvie,	Oct. 18, 1915	Oct. 9	Dec. 9
Granby.	Hampshire.	1916.	Samuel Hobbs,	Oct. 19, 1915	April 8	Oct. 7
Great Barrington.	Berkshire.	1916.	E. H. Townsend,	Sept. 21, 1915	April 12	Aug. 31
Great Barrington.	Berkshire.	Chapter 221.	R. H. Houston,	July 19, 1916	July 24	Dec. 17
Great Barrington.	Berkshire.	Chapter 221.	R. H. Houston,	Nov. 24, 1915	April 8	April 15
Hamilton.	Essex.	1916.	C. W. Sterl,	Nov. 23, 1915	April 17	Dec. 31
Hancock.	Berkshire.	Surfacing.	Ernest E. Lothrop,	Aug. 26, 1916	Aug. 26	Dec. 9
Hingham.	Plymouth.	Surfacing.	Geo. N. Babson,	May 16, 1916	June 5	Dec. 25
Hingham.	Plymouth.	Bridge.	M. J. Dalton,	May 16, 1916	June 8	Nov. 24
Hinsdale.	Berkshire.	1916.	C. Leonard Brown,	Sept. 6, 1916	Sept. 11	Aug. 24
Lowell.	Middlesex.	Surfacing.	F. T. McAvooy,	Sept. 12, 1916	Sept. 30	Nov. 11
Lowell.	Middlesex.	Surfacing.	Philip H. Ladd,	June 6, 1916	July 7	Dec. 16
Lunenburg.	Worcester.	Special.	E. N. Briggs,	April 18, 1916	April 27	Nov. 26
Lunenburg.	Worcester.	1916.	E. N. Briggs,	July 11, 1916	June 15	Aug. 22
Lynn.	Essex.	1916.	H. G. Jewell,	May 10, 1916	May 27	Sept. 2
Marlborough.	Middlesex.	1916.	W. R. Mattison,	July 5, 1916	July 19	Oct. 14
Marlborough.	Middlesex.	Surfacing.	Oshorn Palmer,	Aug. 24, 1915	April 11	April 29
Marlborough.	Middlesex.	Surfacing.	Geo. H. Delano,	Aug. 24, 1915	May 1	Sept. 4
Marshfield.	Plymouth.	Surfacing.	M. J. Dalton,	June 23, 1916	July 24	Dec. 15
Maspee.	Barnstable.	1916.	E. A. Armington,	May 23, 1916	June 12	Dec. 16
Mattapoisett.	Plymouth.	Surfacing.	R. A. Vesper,	July 5, 1916	July 25	Nov. 22
Mattapoisett.	Plymouth.	1916.	H. O. Parker,	July 5, 1916	Oct. 2	Oct. 14
Methuen.	Essex.	1916.	H. D. Fallon,	May 31, 1916	June 12	June 16
Methuen.	Essex.	1916.	E. E. Lothrop,	May 31, 1916	June 9	Aug. 21
Methuen.	Essex.	1916.	H. W. Ingham,	May 31, 1916	Aug. 3	Dec. 9
Millbury.	Worcester.	1916.	Lewis J. Fritz,	Sept. 20, 1916	Sept. 23	Dec. 8
Montague.	Franklin.	Surfacing.	L. R. Sells,	April 11, 1916	April 25	June 3
Montague.	Franklin.	1915.	Carl H. Morrill,	April 11, 1916	June 15	Aug. 1
New Brantree.	Worcester.	1915.	Atlee C. Lingley,	Dec. 8, 1915	June 14	Dec. 2

TABLE SHOWING TOWNS AND CITIES IN WHICH WORK HAS BEEN DONE, ETC. — *Concluded.*

TOWN OR CITY.	County.	Year.	Resident Engineer.	Date of Contract.	Date of Beginning, 1916.	Date of Ending, 1916.
North Adams,	Berkshire,	Surfacing,	A. E. Page,	July 11, 1916	Aug. 17	Nov. 25
North Andover,	Essex,	1916,	Earle O. Turner,	Mar. 14, 1916	April 20	July 29
North Andover,	Essex,	1916,	F. C. Figenbaum,	Mar. 14, 1916	July 31	Dec. 31
Northampton,	Hampshire,	1915,	E. O. Knight,	Aug. 11, 1915	April 11	May 6
Northampton,	Hampshire,	1915,	Chas. M. Daroon,	Aug. 11, 1915	May 8	June 10
Northampton,	Worcester,	Surfacing,	Geo. H. Delano,	Aug. 24, 1916	April 11	Nov. 11
Northbridge,	Worcester,	1916,	Samuel Hobbs,	July 6, 1916	July 19	Nov. 8
Northbridge,	Worcester,	1916,	E. W. Harvie,	July 6, 1916	Nov. 13	Dec. 2
Northfield,	Franklin,	Surfacing,	C. H. Morrill,	April 11, 1916	June 8	Aug. 1
Norton,	Bristol,	1916,	A. H. Briggs,	May 23, 1916	June 8	Aug. 9
Oak Bluffs,	Dukes,	Bridge,	H. C. Holden,	Nov. 4, 1915	Jan. 1	Mar. 7
Oakham,	Worcester,	Chapter 221,	Atlee C. Lingley,	July 6, 1915	April 1	May 15
Oxford,	Worcester,	1916,	Norman R. Clark,	July 11, 1916	Sept. 25	Oct. 14
Oxford,	Worcester,	1916,	Atlee C. Lingley,	July 11, 1916	Oct. 16	Dec. 2
Palmer,	Hamden,	Chapter 221,	Wm. J. Hurley,	Sept. 7, 1915	Jan. 1	Dec. 23
Pelham,	Hamden,	Special,	C. H. Morrill,	Oct. 10, 1916	Oct. 25	Dec. 14
Petersham,	Worcester,	Chapter 221,	R. H. Hosford,	Sept. 14, 1915	April 10	Sept. 20
Petersham,	Worcester,	Bridge,	R. H. Hosford,	Sept. 20, 1916	Sept. 18	Dec. 7
Phillipston,	Worcester,	Surfacing,	C. H. Morrill,	April 26, 1916	May 24	June 3
Phillipston,	Worcester,	Surfacing,	W. E. Nightingale,	April 26, 1916	June 5	July 25
Pittsfield,	Berkshire,	Bridge,	Geo. A. Curtis,	Sept. 27, 1916	Sept. 20	Sept. 26
Pittsfield,	Berkshire,	Bridge,	Herbert E. Andrews,	Sept. 27, 1916	Sept. 28	Dec. 2
Plymouth,	Berkshire,	1916,	Allan I. Dean,	May 16, 1916	June 26	Sept. 30
Plymouth,	Plymouth,	1916,	Grover C. Coffin,	May 16, 1916	Oct. 2	Dec. 16
Plymouth,	Plymouth,	1916,	I. C. Holden,	Sept. 26, 1916	Oct. 16	Oct. 28
Plymouth,	Plymouth,	1916,	Grover C. Coffin,	Sept. 26, 1916	Oct. 30	Dec. 16
Reading,	Middlesex,	Surfacing,	R. C. Heath,	April 18, 1916	May 21	Dec. 7
Revere,	Suffolk,	1916,	F. A. Chase,	Nov. 7, 1916	Nov. 1	Dec. 4
Russell,	Hamden,	Chapter 221,	Samuel Hobbs,	Aug. 11, 1915	Nov. 18	Dec. 31
Russell,	Hamden,	Chapter 221,	Rueben Barker,	Aug. 11, 1915	April 18	July 29
Rutland,	Worcester,	Chapter 221,	R. O. Spofford,	Aug. 11, 1915	July 31	Dec. 31
Salsbury,	Essex,	1916,	Atlee C. Lingley,	July 31, 1916	April 1	May 15
Seabate,	Plymouth,	Surfacing,	E. R. Boucher,	June 21, 1916	June 24	Aug. 23
Sheffield,	Berkshire,	1915,	M. J. Dalton,	Nov. 4, 1915	July 6	Dec. 14
			A. S. Page,	Nov. 4, 1915	May	Oct.

Sheffield,	Berkshire,	Chapter 221,	R. H. Houston,	Nov. 24, 1915	April 8	April 15
Sheffield,	Berkshire,	Chapter 221,	C. W. Stord,	Nov. 24, 1915	April 17	Dec. 31
Shrewsbury,	Worcester,	Surfacing,	Geo. H. Delano,	Aug. 24, 1915	April 11	Nov. 3
Somersset,	Bristol,	Surfacing,	H. O. Parker,	May 16, 1916	June 27	Aug. 12
Somersset,	Bristol,	Surfacing,	C. T. Barnard,	May 16, 1916	Aug. 14	Sept. 9
South Hadley,	Hampshire,	Surfacing,	H. O. Parker,	May 16, 1916	Sept. 11	Nov. 8
Southbridge,	Worcester,	1916,	E. H. Townsend,	Sept. 21, 1915	April 12	Aug. 17
Southbridge,	Worcester,	Special,	N. R. Clark,	Nov. 14, 1916	Oct. 24	Nov. 11
Sudbury,	Worcester,	Special,	C. Leonard Brown,	Nov. 14, 1916	Nov. 13	Dec. 9
Taunton,	Middlesex,	Surfacing,	Maurice A. Lynch,	April 18, 1916	May 11	Dec. 16
Taunton,	Bristol,	Surfacing,	Anthony Weldon,	April 26, 1916	May 31	Nov. 15
Taunton,	Bristol,	Surfacing,	H. O. Parker,	April 11, 1916	July 7	Nov. 6
Tewksbury,	Middlesex,	Surfacing,	F. H. Ladd,	June 6, 1916	Sept. 18	Dec. 16
Upton,	Worcester,	Chapter 221,	John M. Kenney,	Sept. 5, 1916	Sept. 18	Dec. 9
Upton,	Worcester,	Chapter 221,	Samuel Hobbs,	Oct. 19, 1915	Jan. 21	Feb. 19
Upton,	Worcester,	Chapter 221,	Earle O. Turner,	Oct. 19, 1915	Feb. 21	April 7
Upton,	Worcester,	Chapter 221,	Samuel Hobbs,	Oct. 19, 1915	April 8	Oct. 7
Uxbridge,	Worcester,	Chapter 221,	E. W. Harvie,	Oct. 19, 1915	Oct. 9	Dec. 9
Walpole,	Worcester,	1916,	H. S. Jewell,	Sept. 12, 1916	Sept. 18	Dec. 9
Ware,	Norfolk,	1916,	Allan I. Dean,	Sept. 13, 1916	Sept. 25	Dec. 8
Wayland,	Hampshire,	Chapter 221,	W. J. Hurley,	Sept. 17, 1915	Jan. 1	Dec. 23
Washington,	Middlesex,	Surfacing,	Maurice A. Lynch,	April 18, 1916	May 11	Dec. 16
Westwood,	Berkshire,	Chapter 221,	Rueben Barker,	Nov. 28, 1916	Aug. 2	Dec. 31
Weymouth,	Norfolk,	Surfacing,	R. A. Vesper,	May 9, 1916	May 22	July 5
Weymouth,	Norfolk,	1915,	E. A. Armington,	Aug. 24, 1915	Jan. 1	Jan. 22
Weymouth,	Norfolk,	1915,	C. E. Manchester,	Aug. 24, 1915	June 19	June 28
Weymouth,	Norfolk,	1915,	E. A. Armington,	Aug. 24, 1915	April 6	June 12
Williamstown,	Hampden,	Surfacing,	E. O. Knight,	May 2, 1916	May 31	Dec. 17
Williamstown,	Berkshire,	1916,	M. G. Tarbell,	Oct. 24, 1916	Nov. 1	Dec. 31
Woburn,	Middlesex,	1915,	L. B. Hoyt,	Nov. 9, 1915	April 5	Dec. 15

APPENDIX E.

SHOWING CONTRACT PRICES ON

TOWN OR CITY.	Contractor.	EXCAVATION.			Portland Cement Concrete Masonry (Cubic Yard).	BITUMINOUS SURFACING.			
		Earth (Cubic Yard).	Borrow (Cubic Yard).	Ledge (Cubic Yard).		Asphalt (Square Yard).	Asphalt (Gallon).	Tar (Square Yard).	Tar (Gallon).
Abington, . . .	Edward J. Rourke, . .	\$0 75	\$0 75	-	-	-	\$0 13	-	-
Andover, . . .	Richmond F. Hudson, .	70	280	\$3 00	\$15 00	-	15	-	-
Arlington-Lexington, .	John A. Gaffey, . . .	75	61 03	1 95	12 00	-	055	7	\$0 035
Ashburnham, . . .	Bertram E. Savage, . .	85	1 00	3 00	15 00	-	1702	-	-
Ashby, . . .	David H. Damon, . . .	1080	111 00	121 25	-	-	16	-	-
Ashfield, . . .	Town, . . .	60	60	2 25	12 00	60 75	-	-	-
Ayer, . . .	Richmond F. Hudson, .	85	1 00	2 00	14 00	-	15	-	-
Barnstable, . . .	Charles T. Alger, . . .	2075	85	1190	-	-	-	-	\$0 125
Barnstable-Mashpee, .	Central Construction Company, .	35	30	-	9 00	2154	-	-	-
Barre, . . .	Charles E. Horne, . . .	75	111 00	-	-	-	14	-	-
Belchertown, . . .	Town, . . .	70	85	2 50	15 00	-	-	-	-
Bourne-Plymouth, . .	Central Construction Company, .	45	55	2 50	9 00	2150	-	-	-
Clarksburg, . . .	Generoso Ferullo & Co, . . .	151 60	75	3 00	317 00	-	221 50	3330	-
Dartmouth, . . .	Acushnet Construction Company, .	75	75	-	-	-	-	-	-
Dennis, . . .	Charles T. Alger, . . .	2075	85	1190	-	-	-	-	125
Dighton-Taunton, . .	Estate of Hamilton Flood, .	60	65	111 00	-	-	13	-	-
Dudley, . . .	Lane Construction Corporation, .	65	685	2 00	15 00	-	-	-	06
Duxbury-Seituate-Marshfield, .	Antonio Carchia, . . .	1 25	90	111 00	121 80	-	-	-	-
East Bridgewater, . .	Town, . . .	60	65	2 00	14 00	3785	-	3840	10
Freetown, . . .	Zebulon L. Canedy, . .	75	85	-	-	-	06	-	-
Gloucester, . . .	Andrew M. Cusack, . .	3960	290	2 50	-	-	05	-	-
Gloucester, . . .	Perini Construction Company, .	1 00	61 50	3 00	16 00	-	15	-	-
Great Barrington, . .	Generoso Ferullo & Co, . . .	60	61 00	1 75	9 90	-	-	-	-
Hamilton, . . .	Town, . . .	1 00	1 25	1 25	12 00	-	05	-	-
Hancock, . . .	Perini Construction Company, .	391 10	61 75	-	-	-	-	-	-

¹ Including loosening, scarifying and reshaping macadam.

² Gravel borrow, no overhaul allowed, cubic yard.

³ Or crushed gravel.

⁴ Twelve-inch iron water pipe, lineal foot.

⁵ Eighteen-inch iron water pipe, lineal foot.

⁶ Gravel borrow, cubic yard.

⁷ Shaping roadbed for broken stone, etc.

⁸ Ten-inch clay pipe, lineal foot.

⁹ Fifteen-inch clay pipe, lineal foot.

¹⁰ Excepting broken stone.

¹¹ Sand filling, cubic yard.

¹² Excavating, screening and replacing broken stone, cubic yard.

¹³ Cubic yards, culvert excavation.

¹⁴ Rustic guard rail, lineal foot.

¹⁵ Cubic yards, bridge excavation.

¹⁶ Bridge concrete, cubic yard.

¹⁷ Asphaltic oil.

¹⁸ Gravel for surfacing, cubic yard.

¹⁹ Rubble masonry, cubic yard.

²⁰ Including removal of old oil.

APPENDIX E.

STATE HIGHWAYS DURING 1916.

Concrete Surfacing (Cubic Yard).	BROKEN STONE.		PIPE CULVERTS (LINEAL FOOT).						Fencing (Lineal Foot).	Stone Filling for Under-drains (Cubic Yard).	Bounds (Each).	Catch Basins (Each).
	Local (Ton).	Trap (Ton).	CLAY.			CORRUGATED IRON.						
			Twelve-inch.	Eighteen-inch.	Twenty-four-inch.	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.				
-	1\$1 85	-	-	-	-	-	-	-	-	-	-	-
-	81 75	-	-	-	-	4\$2 50	5\$3 00	-	\$0 40	-	-	-
-	1 78	-	8\$0 75	9\$0 98	-	42 10	-	-	-	-	-	-
18\$1 35	-	-	-	-	-	85	1 75	-	37	\$1 25	-	-
-	-	\$3 17	-	-	-	-	-	-	1 10	-	-	-
181 00	-	-	1415	-	-	1 50	-	-	151 75	1 00	-	1618 50
61 00	1 90	-	90	1 50	9\$1 00	42 50	880	-	40	1910 00	2 00	40 00
-	-	2 65	-	-	-	-	-	-	-	-	-	-
-	221 00	-	1 00	1 50	2360	-	-	-	20	2450	50	251960 00
-	-	12 38	-	-	-	-	-	-	-	-	-	-
181 00	2685	-	-	-	271 50	1 25	1 75	28\$1 35	1415	1 10	-	-
221 00	-	-	-	-	292 50	301 45	-	-	25	241 00	-	35 00
8415 00	-	-	-	-	-	-	-	-	50	3527 00	3675	-
4 19	-	-	-	-	-	-	-	-	-	-	-	-
-	-	12 75	-	-	-	-	-	-	-	-	-	-
-	-	12 15	-	-	-	-	-	-	-	-	-	-
111 00	-	2 40	85	1 50	-	3520 00	151 25	-	35	1 25	2 50	3418 00
-	-	12 75	-	-	-	-	-	-	-	1 35	-	-
-	1 90	-	85	281 20	271 35	1 05	1 50	3090	30	1 20	2 00	30 00
-	1 80	-	-	-	-	-	-	-	-	-	-	-
-	2 25	-	-	-	-	-	-	-	35	-	-	-
4015 00	2 10	-	1 00	-	-	42 00	411 75	-	40	-	2 50	40 00
-	2 25	-	-	-	-	1 05	-	-	43	92	3 01	-
-	-	2 25	875	-	-	412 85	-	-	40	4010 00	2 00	35 00
6 25	-	-	-	-	-	-	-	-	-	1 75	-	-

21 Sand and asphalt.

22 Rock embankment, cubic yard.

23 Eight-inch clay pipe, lineal foot.

24 Hardening for subgrade, cubic yard.

25 Pile bridge in place.

26 Gravel for subgrade, cubic yard.

27 Sixteen-inch corrugated iron pipe, lineal foot.

28 Fourteen-inch corrugated iron pipe, lineal foot.

29 Twenty-inch clay pipe, lineal foot.

30 Ten-inch corrugated iron pipe, lineal foot.

31 Boulder concrete, cubic yard.

32 Granolithic sidewalk, square yard.

33 Waterproofing, square yard.

34 1-2 1/2-5 concrete masonry, cubic yard.

35 1-2-4 concrete masonry, cubic yard.

36 Concrete curb, lineal foot.

37 Cobblestone gutters in place, square yard.

38 Relaying old cobblestone gutters, square yard.

39 Including broken stone.

40 Curb inlets, each.

41 Ten-inch iron water pipe, lineal foot.

SHOWING CONTRACT PRICES ON

TOWN OR CITY.	Contractor.	EXCAVATION.			Con- crete Masonry (Cu- bic Yard).	BITUMINOUS SURFACING.			
		Earth (Cubic Yard).	Borrow (Cubic Yard).	Ledge (Cubic Yard).		Asphalt (Square Yard).	Asphalt (Gallon).	Tar (Square Yard).	Tar (Gallon).
Hingham, . . .	E. C. Sargent, Assignee,	\$0 90	\$1 20	\$1 20	\$1 00	-	\$0 125	-	-
Hinsdale, . . .	Carl B. Lindholm, . .	2 50	1 00	5 00	422 00	-	-	-	-
Kingston, . . .	Thomas & Murphy, . .	45	75	3 00	6 00	\$0 45	850	-	-
Lowell-Tewksbury, . .	Fred E. Ellis, . . .	1090	11 50	-	-	-	06	-	-
Lunenburg, . . .	R. H. Newell Com- pany.	60	11 35	21 40	-	-	15	-	-
Lunenburg, . . .	Town, . . .	70	70	61 05	18 00	-	-	-	-
Lynn, . . .	City, . . .	65	-	2 50	12 25	-	-	-	-
Marlborough, . . .	John A. Gaffey, . . .	93	161 20	3 00	-	-	-	-	-
Mattapoisett, . . .	Acushnet Construc- tion Company.	75	75	162 50	-	-	-	-	-
Methuen, . . .	Middlesex Construc- tion Company.	1970	80	3 00	15 00	201 75	05	\$0 85	21 \$0 60
Methuen, . . .	Joseph Wagenbach & Son.	60	60	1 00	30 00	-	07	-	-
Millbury, . . .	Charles C. Horne, . .	1 00	161 00	-	-	-	-	-	-
Montague, . . .	Richmond F. Hudson,	2775	1675	11 00	-	-	15	-	-
North Adams, . . .	Davis & Brock, . . .	1 00	161 25	-	-	-	-	-	-
North Andover, . . .	David J. Sheehan, . .	50	60	2 00	9 00	-	-	-	-
Northbridge, . . .	Southbridge Engineer- ing and Construction Company.	55	70	4 00	8 50	1812 00	-	-	-
Northfield, . . .	Lane Construction Cor- poration.	1 00	11 25	-	-	-	13	-	-
Norton, . . .	Town, . . .	2960	70	2 00	9 00	1670	-	-	-
Oxford, . . .	Lane Construction Cor- poration.	65	161 00	3 00	15 00	11 00	\$42 50	\$20 00	06
Pelham, . . .	Cordner & Montague,	80	90	2 50	16 00	-	3516	-	-
Petersham, . . .	R. L. Whipple & Co., .	341 75	3790	51 25	418 50	-	-	-	-
Phillipston, . . .	Charles E. Horne, . .	2780	161 25	11 25	-	-	17	-	-
Pittsfield, . . .	Carl B. Lindholm, . .	381 50	291 25	-	418 00	-	-	-	-
Plymouth, . . .	Edward J. Rourke, . .	70	80	3 00	16 00	-	16	-	-
Reading, . . .	Richmond F. Hudson,	70	1170	1690	-	-	4115	-	4210
Revere, . . .	Antonio G. Tomasello,	95	95	1 00	17 00	-	-	-	12
Salisbury, . . .	James E. Watkins, . .	50	75	4540	-	-	-	-	-
Somerset, . . .	Joseph McCormick, . .	75	90	11 10	-	-	16	-	-
Southbridge, . . .	Thomas McGovern, . .	55	55	2 50	20 00	161 00	-	-	135
Upton, . . .	Charles E. Horne, . .	85	1 00	2 50	14 00	-	-	-	-
Uxbridge, . . .	Luchini-Manzani Com- pany.	1 00	1 00	4 00	12 00	-	-	-	-

1 Sand filling, cubic yard.

2 Excavating, screening and replacing broken stone, cubic yard.

3 Including loosening, scarifying and reshaping macadam.

4 1-2 1/2-5 concrete masonry, cubic yard.

5 Gravel for surfacing, cubic yard.

6 1-2-4 concrete masonry, cubic yard.

7 Sand and asphalt.

8 Cobblestone gutters in place, square yard.

9 Eight-inch corrugated iron pipe, lineal foot.

10 Including broken stone.

11 Gravel borrow, no overhaul allowed, cubic yard.

12 Fourteen-inch corrugated iron pipe, lineal foot.

13 Rustic guard rail, lineal foot.

14 Ten-inch clay pipe, lineal foot.

15 Ten-inch iron water pipe, lineal foot.

16 Gravel borrow, cubic yard.

17 Fifteen-inch clay pipe, lineal foot.

18 Curb inlets, each.

19 Except bridge and trench.

20 Broken stone for side drains, ton.

21 Twelve-inch vitrified clay pipe for side drains, lineal foot.

22 Ten-inch vitrified clay pipe for side drains, lineal foot.

23 Five-inch vitrified clay pipe for side drains, lineal foot.

STATE HIGHWAYS DURING 1916 — *Continued.*

Concrete Surfacing (Cubic Yard).	BROKEN STONE.		PIPE CULVERTS (LINEAL FOOT).						Fencing (Lineal Foot).	Stone Filling for Under-drains (Cubic Yard).	Bounds (Each).	Catch Basins (Each).
	Local (Ton).	Trap (Ton).	CLAY.			CORRUGATED IRON.						
			Twelve-inch.	Eighteen-inch.	Twenty-four-inch.	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.				
-	-	\$2 45	-	-	-	-	-	-	-	\$1 25	-	-
\$1 25	-	-	-	-	-	-	-	-	-	\$22 00	-	-
-	-	-	-	-	-	90 50	-	-	\$0 25	-	\$1 50	\$25 00
-	-	32 35	-	-	-	-	-	-	-	-	-	-
-	-	32 70	-	-	-	-	-	-	-	1 00	-	-
-	-	-	-	-	-	1 35	120 50	\$2 25	120	1 25	-	-
-	\$1 65	-	140 65	\$1 50	-	151 50	-	-	40	80	3 00	30 00
6 30	-	-	85	171 15	140 75	-	-	-	-	1812 50	2 25	40 00
4 49	-	-	-	-	-	-	-	-	-	1 50	-	-
-	2 00	22 45	85	1475	2325	242 50	151 50	1815 00	35	251 50	2 50	50 00
27 00	1 85	-	141 00	-	-	-	-	-	45	1687	2 00	40 00
6 00	-	-	-	-	-	-	-	-	-	-	-	-
-	-	32 40	-	-	-	-	-	-	-	-	-	-
6 50	-	-	-	-	-	-	-	-	-	-	-	-
290	1 50	-	1460	-	-	242 50	294 00	-	30	3078	2 00	27 50
4 05	1 70	-	1 10	1 75	-	242 40	151 95	-	30	161 45	1 75	30 00
-	-	32 60	-	-	-	-	-	-	-	-	-	-
4 75	3160 00	-	3250	-	985	1 15	1 75	331 45	30	1 00	2 00	30 00
18 00	-	2 45	85	1 50	-	-	-	-	35	1 25	2 50	-
-	1 90	-	-	-	362 10	1 50	121 60	331 70	30	-	-	-
623 50	-	-	-	-	-	-	-	-	-	-	-	-
-	-	33 50	-	-	-	-	-	-	-	-	-	-
618 00	-	-	-	-	-	-	-	-	-	-	-	-
1330 00	2 10	-	85	1 85	3260	1470	401 50	-	35	1 50	2 00	35 00
-	431 75	-	-	-	-	-	-	-	-	-	-	-
-	2 30	-	1 50	3280	141 20	242 75	-	4450	15	161 35	4 00	40 00
-	-	-	-	-	-	-	-	-	-	-	-	-
-	32 25	21 00	-	-	-	-	-	-	-	1 35	-	-
4611 00	-	2 50	1 00	1 75	-	1 00	1 40	121 10	-	95	-	30 00
-	-	-	75	1 50	-	-	-	-	35	51 30	-	-
5 95	-	-	1480	2 25	-	152 50	243 00	471 50	40	161 25	2 50	45 00

²⁴ 12-inch iron water pipe, lineal foot.²⁵ Trench excavation, cubic yard.²⁶ Rubble masonry, cubic yard.²⁷ Including removal of old oil.²⁸ Twenty-inch iron water pipe, lineal foot.²⁹ Except grubbing and clearing at cut-off.³⁰ Gravel for subgrade, cubic yard.³¹ Grubbing and clearing, per acre.³² Eight-inch clay pipe, lineal foot.³³ Sixteen-inch corrugated iron pipe, lineal foot.³⁴ Cubic yards, bridge excavation.³⁵ Asphaltic oil.²⁶ Twenty-inch corrugated iron pipe, lineal foot.³⁷ Including overhaul.³⁸ Including ledge.³⁹ Borrow for backfilling, cubic yard.⁴⁰ Ten-inch corrugated iron pipe, lineal foot.⁴¹ Asphalt mix.⁴² Asphalt penetration.⁴³ Or crushed gravel.⁴⁴ Piles in place, lineal foot.⁴⁵ Gravel for surfacing, furnished by Commission.⁴⁶ Concrete masonry for pipe ends, cubic yard.⁴⁷ Side drains, lineal foot.

SHOWING CONTRACT PRICES ON

TOWN OR CITY.	Contractor.	EXCAVATION.			Portland Cement Concrete Masonry (Cubic Yard).	BITUMINOUS SURFACING.			
		Earth (Cubic Yard).	Borrow (Cubic Yard).	Ledge (Cubic Yard).		Asphalt (Square Yard).	Asphalt (Gallon).	Tar (Square Yard).	Tar (Gallon).
Walpole, . . .	Martino De Matteo, .	\$1 00	\$1 10	\$2 00	\$1 50	\$0 10	-	-	-
Washington, . .	Richmond F. Hudson,	80	80	2 00	12 00	\$25 00	\$0 04	\$1 00	-
Wayland-Sudbury, .	R. F. Hudson, Assignee,	70	\$1 00	-	-	-	04½	-	-
Westwood, . . .	Fred E. Ellis, . . .	1 20	1 30	1 50	-	-	-	-	-
Wilbraham, . . .	Lane Construction Corporation.	785	\$85	-	-	-	-	-	\$0 11½
Williamstown, . .	John F. Lewis, . . .	70	70	2 00	12 00	-	-	-	-
Woburn, . . .	Antonio Pallatto, Assignee.	85	\$80	2 50	17 50	1065	12	-	-

¹ Sand filling, cubic yard.² Ten-inch corrugated iron pipe, lineal foot.³ 1-2-4 concrete masonry, cubic yard.⁴ Rock embankment, cubic yard.⁵ Cubic yards, bridge excavation.⁶ 1-2½-5 concrete masonry, cubic yard.⁷ Including broken stone.⁸ Gravel borrow, cubic yard.⁹ Including loosening, scarifying and reshaping macadam.

STATE HIGHWAYS DURING 1916 — *Concluded.*

Concrete Surfacing (Cubic Yard).	BROKEN STONE.		PIPE CULVERTS (LINEAL FOOT).						Fencing (Lineal Foot).	Stone Filling for Under-drains (Cubic Yard).	Bounds (Each).	Catch Basins (Each).
	Local (Ton).	Trap (Ton).	CLAY.			CORRUGATED IRON.						
			Twelve-inch.	Eighteen-inch.	Twenty-four-inch.	Twelve-inch.	Eighteen-inch.	Twenty-four-inch.				
-	-	\$2 25	-	-	-	\$1 25	2\$0 80	-	\$0 35	\$2 00	\$1 00	\$40 00
⁵ \$3 00	\$1 70	-	\$1 00	\$1 50	\$2 50	-	-	-	25	1 40	2 00	⁶ 16 00
-	⁹ 1 92	-	-	-	-	-	-	-	-	-	-	-
-	-	⁹ 2 57	-	-	-	-	-	-	-	-	-	-
3 50	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	1 10	-	-	35	1 50	⁸ 1 25	-
115 00	121 75	-	85	1 50	1375	142 25	152 50	-	35	2 50	1610 00	40 00

¹⁰ Cobblestone gutters in place, square yard.¹¹ Rubble masonry, cubic yard.¹² And crushed gravel.¹³ Ten-inch clay pipe, lineal foot.¹⁴ Ten-inch iron water pipe, lineal foot.¹⁵ Twelve-inch iron water pipe, lineal foot.¹⁶ Curb inlets, each.

APPENDIX F.

STATEMENT OF CLAIMS AGAINST THE COMMISSION.

[As required by section 5, chapter 18 of the Revised Laws.]

NAME.	Residence.	Nature of Claim.
Allen, Susie M., . .	Salisbury, . .	Damages due to construction of State highway in Salisbury.
Boudreau, William, . .	Wilmington, . .	Damage due to accident alleged to have occurred on State highway in Wilmington.
Clifford, John A., . .	Salisbury, . .	Damages due to construction of State highway in Salisbury.
Damon, W. Allan, . .	Rockland, . .	Damage due to accident alleged to have occurred on State highway in Rockland.
Flagg, Lucretia T., . .	Northampton, . .	Damages due to construction of State highway in Northampton.
Follansbee, Daniel, . .	Salisbury, . .	Damages due to construction of State highway in Salisbury.
Haven, Herbert H., . .	Dudley, . .	Damages due to construction of State highway in Dudley.
Ireson, Jennie E., . .	Wrentham, . .	Damages due to construction of State highway in Wrentham.
Jacques, Rose, . .	Grafton, . .	Damages due to construction of State highway in Grafton.
Jordan, S. Annie, . .	Wrentham, . .	Damages due to construction of State highway in Wrentham.
Kneisel, Joseph, . .	Dedham, . .	Damages due to construction of State highway in Dedham.
Knight, Jennie B., . .	Shrewsbury, . .	Damage due to accident alleged to have occurred on State highway in Shrewsbury.
Lally, Thomas, . .	Salisbury, . .	Damages due to construction of State highway in Salisbury.
Lynch, Jennie M., . .	Wareham, . .	Damages due to construction of State highway in Wareham.
McDonough, Michael, . .	Swampscott, . .	Claim for extra compensation under contract for construction of Humphrey St., Swampscott.
McGee, John P., . .	Marlborough, . .	Damages due to construction of State highway in Marlborough.
Moran, James, . .	West Boylston, . .	Damages due to construction of State highway in West Boylston.
Moran, Mary E., . .	West Boylston, . .	Damages due to construction of State highway in West Boylston.
Nason, Arthur L., . .	Salisbury, . .	Damages due to construction of State highway in Salisbury.
Ray, Foster S., . .	Charlton, . .	Damages due to construction of State highway in Charlton.
Reed, William H., . .	Gloucester, . .	Damages due to accident alleged to have occurred on State highway in Gloucester.
Salisbury Beach Associates,	Salisbury, . .	Damages due to construction of State highway in Salisbury.
Snow, Frank E., . .	Wrentham, . .	Damages due to construction of State highway in Wrentham.
Taft, Kate P., . .	Northampton, . .	Damages due to construction of State highway in Northampton.
Wade, Julia A., . .	Lee, . .	Damages due to construction of State highway in Lee.
York, Addie A., . .	Wrentham, . .	Damages due to construction of State highway in Wrentham.

APPENDIX G.

MAINTENANCE.

Table showing the Amounts expended for Repair and Maintenance during 1916, the Cost per Mile for Maintenance, the Cost per Mile for Maintenance, the Number of Miles under Maintenance and the Amounts to be assessed upon Municipalities for Maintenance under Chapter 47 of the Revised Laws.

TOWN OR CITY.	AMOUNTS EXPENDED.					Total expended.	EXPENDED PER MILE IN 1916.			Length under Maintenance (Miles).	Cost per Mile per Year.	Amounts to be assessed on Cities and Towns.
	REVENUE APPROPRIATION.		MOTOR VEHICLES FEES FUND.		From Revenue Appropriation.		From Motor Vehicles Fees Fund.	Total.				
	Totals to 1916.	During 1916.	Total.	Totals.								
Abington,	\$4,477 96	\$1,345 74	\$5,823 70	\$17,044 08	\$10,031 80	\$27,075 88	\$226 55	\$1,088 86	\$1,915 41	5.94	\$659 44	\$1,188 00
Acton,	9,029 65	1,483 58	10,513 23	5,208 80	578 54	5,847 34	193 17	75 33	268 50	7.68	189 14	1,031 06
Acushnet,	7,666 40	1,850 91	9,517 31	6,692 58	16 55	6,709 13	542 79	4 85	547 64	3.41	315 61	341 00
Adams,	6,292 63	714 52	7,007 15	2,585 21	134 72	2,719 93	351 98	66 36	418 34	2.03	428 69	424 62
Agawam,	7,964 30	2,306 55	10,270 85	11,925 63	73 94	11,999 57	578 08	18 63	596 61	3.99	617 25	798 00
Amesbury,	6,613 77	1,302 82	7,916 59	788 79	352 95	1,141 74	394 79	106 95	501 74	3.30	230 32	827 88
Amherst,	2,805 30	1,125 30	3,930 60	3,743 23	832 19	4,575 42	276 48	204 46	480 94	4.07	455 11	978 74
Andover,	18,363 56	969 41	19,322 97	37,137 94	27,781 94	64,919 88	231 36	6,630 53	8,861 89	4.19	1,290 38	6,959 91
Ashburnham,	2,067 41	2,393 87	4,453 28	283 03	1,524 79	4,418 82	3,575 92	2,275 80	5,851 72	6.67	2,263 93	711 89
Ashby,	13,461 87	57 50	13,519 37	21,823 05	18,668 73	40,491 78	11 29	3,667 74	3,679 03	5.09	711 89	254 50
Ashfield,	4,289 58	282 72	4,572 30	697 38	1,152 07	5,724 45	175 60	715 57	891 17	1.61	220 68	80 50
Ashland,	2,914 34	592 32	3,506 66	1,904 99	221 88	2,126 87	185 10	69 33	254 43	3.20	195 27	320 00
Attol,	11,998 52	471 84	12,470 36	12,285 44	302 90	12,583 34	152 20	97 70	249 90	3.19	511 92	387 37
Attleboro,	7,559 67	1,729 41	9,289 08	24,425 09	4,634 97	29,060 06	510 15	1,367 24	1,877 39	3.39	855 63	1,712 07
Auburn,	30,134 84	3,964 51	34,099 35	20,076 16	767 61	20,843 77	750 85	145 38	896 23	5.28	633 59	528 00
Avon,	—	87 66	87 66	20,076 16	419 00	506 66	66 91	319 84	386 75	1.31	308 93	131 00
Ayer,	658 80	712 87	1,371 67	157 80	994 67	1,152 47	440 05	613 99	1,054 04	1.62	626 34	324 00
Barnstable,	11,775 89	9,427 59	21,203 48	28,876 65	1,486 37	30,365 02	844 01	133 06	977 07	11.17	438 51	3,037 13

Table showing the Amounts expended for Repair, Maintenance, etc.—Continued.

TOWN OR CITY.	AMOUNTS EXPENDED.				Total expended.	EXPENDED PER MILE IN 1916.			Cost per Mile maintained per Year.	Length under Maintenance (Miles).	Amounts to be assessed on Cities and Towns.	
	REVENUE APPROPRIATION.		MOTOR VEHICLES FEES FUND.			From Revenue Appropriation.	From Motor Vehicles Fees Fund.	Total.				
	Totals to 1916.	During 1916.	Total.	Totals to 1916.								Total.
Barre.	\$12,859 98	\$630 85	\$13,490 83	\$14,088 52	\$15,605 02	\$218 28	\$4,874 92	\$5,093 20	\$635 56	2 89	\$578 00	
Becket.	15,022 84	3,351 50	18,374 31	1,218 21	21,003 31	377 42	137 18	514 60	646 28	8 88	444 00	
Bedford.	2,485 61	1,439 65	3,925 26	5,111 68	5,291 36	179 68	108 89	375 31	351 77	1 65	309 66	
Belchertown.	2,622 72	1,124 42	3,747 14	969 00	4,677 14	710 39	219 93	568 04	175 39	3 23	323 00	
Bellingham.	2,787 81	732 36	3,520 17	4,722 85	4,983 54	260 69	81 97	312 27	243 66	3 18	318 00	
Berkley.	1,113 89	285 57	1,399 46	293 83	396 40	102 57	81 40	308 04	196 69	1 26	63 00	
Bernardston.	2,794 27	1,221 35	4,015 62	2,459 25	3,652 52	235 90	221 13	460 03	430 48	5 19	259 50	
Beverly.	44,475 75	2,022 20	47,397 95	89,127 97	91,849 42	2,721 45	479 12	993 59	1,738 64	5 68	2,821 82	
Billerica.	1,193 41	286 73	1,480 14	724 33	100 53	186 20	321 03	815 39	555 97	58	116 00	
Blackstone.	5,655 21	1,858 72	7,513 93	3,784 62	4,371 50	586 88	157 34	655 65	338 23	3 73	746 00	
Bourne.	7,822 30	2,152 55	9,974 85	11,300 51	25,028 69	166 86	876 00	1,042 86	409 01	12 90	6,726 53	
Boston.	7,392 26	2,840 90	10,233 16	57,523 91	61,176 17	2,029 21	41,088 50	43,117 71	6,875 51	1 40	2,800 00	
Boxborough.	4,819 61	872 91	5,692 52	268 10	6,431 25	263 71	80 99	344 70	278 39	3 31	165 50	
Braintree.	2,673 16	610 43	3,283 59	3,968 74	4,341 01	372 27	150 71	397 84	453 31	2 47	491 35	
Brewster.	12,884 74	1,783 55	14,668 29	1,543 00	22,599 61	228 08	197 31	425 39	173 19	7 82	782 00	
Bridgewater.	5,439 14	651 88	6,091 02	14,945 86	24,473 21	187 87	4,307 16	4,495 03	801 37	3 47	694 00	
Brimfield.	5,545 05	178 56	5,723 61	744 80	11,968 72	44 97	187 60	232 57	274 43	3 97	198 50	
Brookton.	13,971 45	869 66	14,841 11	24,341 03	39,586 69	229 46	1,044 48	1,273 94	816 75	3 79	2,414 13	
Brookfield.	13,470 72	1,563 14	15,042 86	5,397 96	9,529 85	337 61	1,165 86	1,503 47	427 72	4 63	463 00	
Buckland.	11,406 48	1,564 12	13,060 60	3,668 80	14,777 44	364 59	79 22	443 81	386 75	4 29	214 50	
Burlington.	7,142 05	1,257 33	8,399 38	3,638 27	4,701 58	330 87	279 81	610 68	297 14	3 80	190 00	
Canton.	8,686 21	1,195 15	9,881 36	3,936 22	17,770 62	370 00	1,218 64	1,588 64	902 19	3 23	2,175 30	
Charlmont.	7,639 36	3,027 57	10,666 93	1,659 07	3,632 11	359 98	197 27	557 25	691 11	8 41	420 50	
Charlton.	9,913 68	8,857 79	13,771 47	2,890 23	6,776 68	389 28	291 64	680 92	304 24	9 91	991 00	
Chatham.	7,436 59	2,478 79	9,915 38	1,039 39	15,698 59	345 71	144 96	490 67	322 84	7 17	717 00	
Chelmsford.	8,791 39	2,273 89	11,065 28	2,066 35	13,129 07	316 26	287 39	603 65	385 81	7 19	1,438 00	
Chelsea.	4,848 13	951 80	5,799 93	481 42	16,053 79	991 46	501 47	1,492 93	1,735 80	96	236 61	
Cheshire.	12,633 58	1,720 53	14,354 11	2,190 14	18,489 95	254 51	323 98	578 49	437 78	6 76	676 00	
Chester.	12,907 82	1,659 10	14,566 92	3,023 99	14,383 23	280 61	456 79	707 40	454 62	6 62	331 00	
Chicopee.	23,025 87	1,082 94	24,108 81	996 54	46,714 75	278 39	256 19	534 38	1,499 59	3 89	1,039 74	
Chilmark.	4,443 00	689 91	5,132 91	7,103 78	12,236 69	88 46	124 07	214 06	228 55	7 80	390 00	
Clarksburg.	3,848 01	800 32	4,648 33	197 00	784 76	661 42	162 80	824 22	524 94	1 21	60 50	
Cohasset.	5,825 56	1,254 42	7,079 98	397 97	9,952 01	550 13	174 54	724 67	463 45	2 28	826 19	

Colrain,	3,392 33	771 42	4,163 75	1,107 65	141 19	1,248 84	5,412 59	66 28	398 44	164 87	2. 13	106 50
Concord,	14,566 82	2,127 29	16,694 11	4,561 49	680 75	5,242 24	21,936 35	162 47	670 17	411 95	4. 19	1,404 02
Dalton,	10,199 10	519 31	10,718 41	4,249 02	1,259 38	5,508 40	16,226 81	491 94	694 79	370 48	2. 56	889 35
Danvers,	9,007 45	110 94	11,126 63	44,066 12	16,637 55	60,603 67	71,730 60	19 79	180 57	-	. 69	62 30
Dartmouth,	675 18	2,119 48	11,126 63	44,066 12	16,637 55	60,603 67	71,730 60	3,642 63	4,109 40	1,108 15	4. 54	4,277 17
Deerham,	26,191 42	468 41	1,143 59	358 35	441 36	799 71	1,943 30	187 01	385 48	106 31	2. 36	454 89
Deerfield,	20,191 42	2,041 62	28,233 04	48,559 29	4,450 18	53,009 47	81,242 51	567 62	828 03	916 96	7. 54	1,568 00
Dennis,	12,863 25	9,355 05	22,218 90	9,076 70	2,952 38	12,029 08	34,247 98	1,247 42	393 65	1,641 07	7. 50	1,750 00
Dighton,	4,144 23	524 75	4,968 98	20,614 63	1,489 95	22,104 58	27,073 56	135 20	379 45	598 31	6. 10	610 00
Douglas,	3,217 84	779 84	3,997 68	8,406 88	190 93	8,657 81	12,655 49	89 63	455 75	487 12	2. 13	213 00
Dover,	4,200 95	1,399 88	5,600 83	945 33	832 18	1,777 51	7,270 34	381 73	1,023 88	363 46	2. 18	1,116 03
Draft,	2,636 42	544 57	3,180 99	886 27	1,173 09	2,059 36	5,240 35	230 46	337 44	192 45	5. 09	858 83
Dudley,	6,071 13	639 64	10,937 77	8,445 70	7,558 56	9,204 26	15,915 03	331 34	786 81	633 81	2. 29	458 00
Duxbury,	9,766 17	1,711 63	6,970 80	4,790 85	1,055 19	5,846 04	16,783 84	131 33	249 62	223 49	8. 92	1,113 41
East Longmeadow,	2,488 85	963 95	3,452 80	240 38	346 01	586 39	4,039 19	535 52	727 75	240 57	1. 80	180 00
Eastham,	5,676 91	2,943 63	8,620 54	8,701 17	6,066 43	14,767 60	23,388 14	455 67	1,394 74	448 56	6. 46	323 00
Easthampton,	6,102 21	1,038 96	7,044 17	964 95	43 43	1,008 38	8,052 55	15 68	354 65	178 55	2. 77	401 20
Easton,	1,133 72	551 15	1,684 87	3,863 10	98 26	3,961 36	5,646 23	122 83	811 76	442 15	. 80	324 71
Edgartown,	5,831 49	121 92	5,953 41	1,476 05	272 32	1,748 37	7,701 78	50 38	162 91	206 54	2. 42	197 12
Egremont,	8,498 22	2,073 79	10,572 01	4,411 14	6,066 03	6,880 23	16,938 08	25 82	2,753 87	3,097 36	2. 24	112 00
Essex,	4,288 89	412 99	4,701 88	1,233 91	937 75	5,348 89	15,020 90	255 39	370 88	254 45	8. 12	812 00
Erving,	2,012 93	117 27	2,130 20	18,359 40	561 66	18,921 06	21,051 26	80 87	1,020 90	1,303 77	1. 46	146 00
Fairhaven,	6 00	26 06	32 06	-	7 61	7 61	39 67	868 66	253 67	991 75	. 03	16 84
Fall River,	23,751 42	6,467 82	30,219 24	37,258 94	14,259 27	51,518 21	81,737 47	916 41	1,332 08	484 89	15. 56	10,363 55
Falmouth,	13,948 99	773 41	14,722 40	22,929 49	1,254 54	24,184 03	38,906 43	187 72	304 50	492 22	4. 12	1,013 98
Fitchburg,	4,255 30	5,165 40	9,423 70	3,227 25	2,314 89	5,542 14	14,965 84	713 45	319 74	1,033 19	7. 24	362 00
Florida,	4,411 41	1,055 47	5,466 88	2,743 84	413 46	3,157 30	8,624 18	300 70	418 50	205 98	3. 51	702 00
Foxborough,	5,363 76	2,229 81	7,593 57	5,377 16	295 43	5,672 59	13,260 16	694 64	92 03	786 67	3. 21	1,262 62
Frammingham,	3,892 50	1,623 28	5,515 78	2,620 38	969 68	3,590 06	9,105 84	631 72	689 61	364 82	3. 76	1,296 48
Franklin,	3,987 09	1,065 00	5,052 09	5,875 27	3,107 95	8,983 22	14,035 31	275 19	1,078 27	293 50	3. 87	387 00
Freetown,	8,084 71	382 80	8,467 51	34,109 16	491 49	34,600 65	43,068 16	113 93	146 28	200 21	3. 36	437 15
Gardner,	148 66	212 90	361 56	35 77	2,254 15	2,289 92	2,651 48	68 02	720 17	788 19	3. 13	156 50
Gay Head,	23 50	-	23 50	-	1 12	1 12	24 62	4 00	4 00	25 65	. 28	56
Gill,	19,714 89	47,302 73	16,315 47	16,315 47	29,141 17	3,958 81	76,443 17	3,276 20	7,255 01	1,206 69	4. 98	8,135 82
Gloucester,	7,800 36	606 50	16,123 42	42 41	16,164 83	246 54	24,571 69	17 24	263 78	555 79	2. 46	123 00
Goshen,	9,426 70	2,262 22	11,689 00	8,114 73	720 84	8,841 57	20,530 57	111 04	439 13	456 84	6. 51	1,302 00
Granby,	5,562 71	1,796 31	11,299 02	1,608 38	609 89	2,218 27	13,517 29	209 11	280 11	278 76	8. 59	429 50
Great Barrington,	14,834 88	901 94	15,736 62	30,867 98	131 84	30,999 82	46,736 64	38 67	332 49	734 85	3. 41	516 89
Greenfield,	5,499 40	1,240 81	6,740 21	23,989 81	960 14	24,949 95	31,690 16	175 85	403 10	587 40	5. 46	1,100 47
Groton,	2,512 89	526 34	3,039 23	5,025 68	2,609 58	5,648 81	8,348 12	348 12	696 63	287 32	1. 51	526 01
Groveland,	3,766 22	943 58	4,709 80	3,675 94	192 21	3,868 15	8,577 95	548 59	111 75	660 34	1. 72	172 00
Hadley,	16,300 67	1,336 02	17,636 69	43,694 01	467 18	44,161 19	61,797 88	99 61	384 48	800 39	4. 69	901 60

Lynn,	10,963 58	378 48	11,342 06	7,815 53	866 34	8,681 87	20,023 93	116 45	235 70	352 24	1,419 12	3 25
Mansfield,	1,568 54	378 42	1,946 96	863 97	197 36	1,061 33	3,008 29	312 74	163 10	475 84	199 66	1 21
Marion,	15,253 98	17,233 28	15,253 28	34,151 74	9,256 23	43,407 97	58,701 25	262 94	1,400 34	1,663 18	624 94	6 61
Marlborough,	23,931 97	3,324 54	27,256 51	15,792 33	18,200 59	33,992 92	61,249 43	476 90	2,607 53	3,083 82	698 87	6 98
Marshfield,	11,233 41	1,875 26	13,108 67	22,270 53	10,472 87	32,743 40	45,852 07	226 48	1,264 83	1,491 31	495 59	8 28
Marshpee,	421 57	1,683 04	1,104 61	309 55		395 55	1,500 16	119 62		119 62	74 44	5 71
Mattapoisett,	6,106 32	549 99	6,656 31	22,645 17	9,511 05	32,156 22	38,812 53	171 34	2,962 94	3,134 28	708 13	3 21
Medford,	2,412 41	333 23	2,745 69	18,368 49	54 26	18,362 75	21,108 44	387 53	63 09	450 62	2,915 50	.86
Melrose,	998 51	1,237 84	1,212 35	95 76	182 62	278 38	1,490 73	534 60	456 55	991 15	369 90	.40
Merrimack,	5,017 40	982 45	5,999 85	1,413 65	345 39	1,759 04	7,758 89	440 56	114 88	505 44	221 11	2 23
Methuen,	12,967 29	2,104 30	15,071 59	4,886 20	714 86	5,601 06	20,672 65	334 01	113 47	447 48	356 36	6 30
Middleton,	379 97	187 62	567 59	127 52	168 04	295 56	863 15	70 54	63 17	133 71	145 06	2 68
Middleborough,	18,631 55	1,761 32	20,392 87	48,296 86	8,253 35	56,550 21	76,943 08	141 47	662 92	804 30	459 00	12 45
Millford,	3,281 77	765 23	4,047 00	6,370 86	483 43	6,854 29	19,901 29	215 56	136 17	351 73	360 88	3 55
Millbury,	6,920 92	2,478 90	9,399 82	7,092 47	3,271 68	10,364 15	19,763 97	831 84	1,097 87	1,929 71	519 01	2 98
Milton,	6,809 56	763 82	7,573 38	3,886 10	644 13	4,530 32	11,903 70	877 95	740 37	1,612 32	861 34	.87
Monson,	3,842 70	212 43	4,055 13	706 66	998 14	998 14	5,053 27	131 94	438 91	570 85	190 18	1 61
Montague,	7,686 44	1,061 83	8,748 27	15,746 72	24,498 68	40,245 40	48,993 67	185 31	438 91	570 85	190 18	5 73
Nantucket,	16,902 95	536 58	17,439 53	7,383 55	121 99	7,505 54	24,945 07	82 96	18 82	101 78	210 45	6 48
Natick,	9,052 30	2,789 47	11,841 77	26,639 40	1,073 60	27,713 00	39,554 77	871 71	335 50	1,207 21	933 99	3 20
Needham,	3,049 87	970 34	4,020 21	1,950 89	227 23	2,178 12	6,198 38	478 00	111 94	589 94	250 23	2 63
New Braintree,	468 51	30 26	498 77	37 91	143 70	181 61	680 38	75 65	359 25	434 90	113 77	.40
Newbury,	12,563 40	1,623 97	14,187 37	10,733 32	795 09	11,528 41	25,715 78	383 91	187 96	571 87	443 91	4 23
Newburyport,	10,032 45	759 32	10,791 77	3,987 01	280 49	4,267 50	15,059 27	410 44	151 61	562 05	470 30	1 85
Newton,	1,370 15	289 20	1,659 35	15,400 88	958 94	16,359 82	18,019 17	280 77	931 00	1,211 77	1,160 17	1 03
Norfolk,	4,416 57	627 40	5,044 27	1,369 02	1,206 95	13,175 97	18,220 24	432 69	832 37	1,265 06	488 09	1 45
North Adams,	34,515 73	5,701 72	40,217 45	14,244 40	25,849 30	40,093 70	80,311 15	701 32	3,179 49	3,880 81	1,041 52	8 13
Northampton,	8,622 21	1,342 07	9,964 28	14,814 53	136 69	14,954 53	24,918 81	238 80	24 32	263 12	617 26	5 62
North Andover,	10,040 33	2,394 35	12,434 68	2,541 64	745 01	3,286 65	15,721 33	254 44	79 17	333 61	275 95	9 41
North Attleborough,	7,846 05	1,301 21	9,147 26	43,343 15	808 62	44,151 77	53,299 03	361 44	224 61	586 05	748 05	3 60
Northborough,	11,485 05	1,029 84	15,514 84	15,094 05	28,876 31	43,970 36	56,485 20	231 42	6,489 58	6,791 00	887 57	4 45
Northbridge,	160 94	219 38	380 32	49 40	306 36	355 85	736 17	106 49	148 71	255 20	199 80	2 06
North Brookfield,	2,275 00	814 37	3,089 37	115 81	414 08	529 89	3,619 26	361 94	184 63	545 97	181 05	2 25
Northfield,	4,465 09	460 17	4,925 26	1,335 55	13,369 45	14,704 80	19,630 06	191 73	5,576 06	5,767 79	971 80	2 40
North Reading,	6,047 98	1,298 00	7,346 98	7,418 81	711 58	8,130 39	16,376 07	511 02	280 11	701 13	434 03	2 54
Norton,	5,488 29	1,486 08	6,974 34	3,708 81	390 61	4,099 42	11,073 76	316 17	83 10	399 27	387 59	4 70
Norwood,	10,188 98	1,122 09	11,311 07	16,636 43	1,755 78	18,392 21	29,703 28	542 07	848 20	1,390 27	757 93	2 07
Oak Bluffs,	9,365 08	94 39	9,459 47	1,327 51	326 71	1,654 22	11,113 69	39 82	137 85	177 67	227 50	2 37
Orange,	16,392 88	683 87	17,076 75	27,419 07	261 94	27,681 01	44,757 76	142 77	54 68	107 45	571 82	4 70
Orleans,	5,127 34	1,363 48	6,490 82	9,396 86	2,814 65	12,211 51	18,702 33	290 10	598 86	888 96	320 80	4 70
Oxford,	4,487 22	776 54	5,263 76	2,350 54	656 14	3,006 68	8,270 44	212 75	179 76	392 51	377 64	3 65
Palmer,	24,292 65	2,846 29	27,138 94	35,600 40	8,688 40	44,297 80	71,436 83	283 49	865 38	1,148 87	692 96	10 04
Paxton,	21,663 67	1,970 71	23,634 38	13,554 89	1,159 11	15,014 00	38,648 38	547 41	321 97	1,869 38	546 96	3 60

1 Exempted.

Table showing the Amounts expended for Repair, Maintenance, etc. — Continued.

TOWN OR CITY.	AMOUNTS EXPENDED.					Total ex- pended.	EXPENDED PER MILE IN 1916.			Cost per Mile Maintenance per Year.	Length under Maintenance (Miles).	Amounts to be assessed on Cities and Towns.	
	REVENUE APPROPRIATION.		MOTOR VEHICLES FEES FUND.				From Revenue Appropriation.	From Motor Vehicles Fees Fund.	Total.				
	Totals to 1916.	During 1916.	Total.	Totals to 1916.	During 1916.								Total.
Pembroke,	\$955 34	\$1,208 79	\$2,164 13	\$1,105 07	\$388 90	\$1,493 97	\$3,658 10	\$278 52	\$89 60	\$368 12	\$472 01	4.34	\$434 00
Pepperell,	1,969 86	689 22	2,659 08	1,592 95	831 76	2,424 71	5,083 79	191 98	231 68	423 66	389 86	3.59	718 00
Phillipston,	17,914 45	6,525 08	24,439 53	4,402 09	2,073 58	6,493 58	30,933 11	2,347 15	745 88	3,093 03	901 05	2.78	139 00
Pittsfield,	46,480 10	3,446 23	49,926 33	4,064 09	4,861 14	48,925 23	98,851 56	492 31	665 87	1,158 18	1,052 62	7.00	3,192 12
Plainville,	3,219 88	173 33	3,393 21	21,895 97	976 99	22,872 96	26,266 17	75 36	424 77	500 13	1,084 94	2.30	230 00
Plymouth,	11,663 30	1,499 54	13,162 84	18,367 26	248 75	18,387 42	31,559 26	112 49	18 66	131 15	242 92	13.33	874 14
Princeton,	2,899 88	903 91	3,803 79	3,705 90	569 33	4,275 23	8,079 02	405 34	255 30	660 64	245 56	2.23	446 00
Provincetown,	2,549 74	85 27	2,635 01	11,536 30	122 31	11,658 61	14,293 62	77 51	111 19	188 70	956 10	1.10	103 79
Quincy,	7,295 52	908 85	8,204 37	16,361 06	458 54	16,819 60	25,023 97	340 39	171 93	512 32	771 39	2.67	683 69
Randolph,	1,939 61	505 27	2,444 88	9,300 58	389 84	9,300 58	11,745 46	136 19	105 07	241 26	496 85	3.71	447 51
Raynham,	1,907 30	598 08	2,505 38	2,146 59	313 66	2,462 25	4,967 63	122 05	64 01	186 06	173 09	4.90	455 87
Reading,	25,117 75	13,258 36	38,376 11	32,351 49	7,337 75	39,689 24	78,065 35	3,373 62	1,867 11	5,240 73	1,513 19	3.93	4,354 31
Rehoboth,	11,880 45	1,314 24	13,194 69	21,326 42	475 70	21,802 12	34,996 81	216 25	72 73	288 98	443 65	6.54	654 00
Revere (east),	11,139 38	1,629 36	12,768 74	33,804 01	737 25	34,541 26	47,310 00	1,467 89	664 18	2,132 07	2,063 24	1.11	1,083 30
Revere (northwest),	6,561 13	1,223 74	7,784 87	7,822 40	1,338 94	9,162 34	16,947 21	304 41	333 06	637 47	306 40	4.02	201 00
Richmond,	6,026 24	1,643 69	7,669 93	6,127 35	4,749 31	10,876 66	18,546 59	266 40	769 74	1,036 14	251 41	6.17	617 00
Rochester,	3,330 96	1,295 16	4,626 12	5,527 81	335 00	5,862 81	10,488 93	551 13	142 55	693 68	379 76	2.35	815 08
Rockland,	3,671 58	962 67	4,634 25	3,071 50	257 91	3,329 41	7,963 66	601 66	161 19	762 85	560 82	1.60	320 00
Rockport,	5,885 65	2,210 12	8,095 77	4,940 77	612 17	5,552 87	13,648 64	607 17	168 15	775 32	501 77	3.64	364 00
Rowley,	30,977 08	1,929 87	32,906 95	27,389 77	346 10	27,735 87	60,042 82	289 62	51 97	341 59	479 47	6.66	666 00
Russell,	1,705 94	124 79	1,830 73	4,544 14	415 62	4,959 70	6,850 49	107 57	358 29	465 86	536 87	1.16	58 00
Rutland,	15,822 36	1,570 98	17,393 34	6,113 71	1,123 37	7,237 08	24,630 42	476 05	340 97	816 46	1,809 73	3.30	1,347 17
Salem,	6,007 80	2,118 97	8,126 77	10,623 33	3,180 85	13,804 18	21,930 95	214 03	320 41	535 00	507 07	9.91	991 00
Salisbury,	8,523 64	751 48	9,275 12	8,807 73	3,712 41	12,520 14	21,795 26	103 79	512 76	618 55	321 89	7.24	724 00
Sandwich,	10,521 97	1,774 67	12,296 64	28,914 06	821 72	29,735 78	42,032 42	709 86	328 68	1,038 54	1,415 23	2.50	1,298 19
Saugus,	10,561 03	1,046 08	11,607 11	20,757 92	12,088 22	32,846 14	44,453 25	194 80	2,251 06	2,445 86	684 32	5.37	3,336 08
Scituate,	1,904 90	783 77	2,688 67	1,479 76	642 89	2,115 65	4,859 32	465 98	357 15	823 13	1,295 82	1.80	90 00
Seekonk,	7,611 09	784 04	8,395 13	32,600 39	997 20	33,047 59	41,442 72	130 02	165 36	295 38	738 06	- 6.03	603 00
Seaton,	556 69	185 58	742 27	438 55	49 56	488 11	1,230 38	289 97	77 43	367 40	237 98	7.64	117 57
Sharon,	1,230 95	1,409 26	2,640 21	604 79	2,015 12	4,655 33	193 31	193 46	386 77	331 81	729 00	7.29	729 00
Shelburne,	8,039 91	2,035 54	10,075 45	9,702 20	587 37	10,289 57	20,365 02	942 37	271 93	1,214 30	465 27	2.16	216 00
Shrewsbury,	45,224 94	1,232 67	46,457 61	57,265 94	19,529 12	76,795 06	123,252 07	253 63	4,018 31	4,271 94	4,474 84	4.86	972 00

Shirley, . . .	646 30	1,185 25	176 62	528 03	704 65	1,889 90	179 53	145 86	324 39	356 58	3, 62
Somerser, . . .	1,697 46	16,164 17	68,497 19	25,497 10	93,994 29	110,158 46	170 94	2,567 68	2,738 62	939 76	9, 33
Somerville, . . .	750 16	5,906 51	41,474 32	398 06	41,872 38	47,778 89	474 78	251 30	726 08	4,870 43	1, 38
Southampton, . . .	5, 98	837 96	51 71	90 64	1,142 35	980 31	8 42	127 06	136 08	128 31	3, 69
Southborough, . . .	943 36	5,757 48	3,993 54	382 20	4,375 74	10,133 22	255 65	163 57	359 22	362 66	6, 62
Southbridge, . . .	243 29	2,945 25	4,704 55	1,933 53	6,638 08	8,963 33	278 49	142 71	1,600 59	555 88	1, 36
South Hadley, . . .	2,157 24	48,333 83	38,086 98	671 99	38,758 97	97,092 80	129 88	71 48	3,000 97	981 99	1,088 41
Spencer, . . .	2,053 17	13,932 85	5,550 29	678 30	6,228 59	20,161 44	270 97	221 66	892 63	543 29	9, 40
Stirling, . . .	7,666 35	1,965 73	3,455 96	948 67	4,404 63	14,036 71	240 90	116 26	357 16	252 96	3, 06
Stockbridge, . . .	1,474 96	10,606 34	2,228 21	286 32	2,514 53	13,120 87	446 95	86 76	533 71	461 35	8, 16
Stoneham, . . .	9,131 38	9,683 62	24,734 51	318 48	25,052 63	34,736 61	427 72	201 56	629 28	1,321 70	3, 30
Stoughton, . . .	6,755 81	7,460 39	8,554 56	1,504 81	10,059 37	16,519 76	156 96	270 65	427 61	383 91	880 64
Sturbridge, . . .	872 72	3,792 88	6,582 38	922 41	6,904 69	10,697 57	230 45	136 61	373 06	399 16	497 14
Sudbury, . . .	558 04	3,069 98	11,652 83	48,857 00	60,509 93	91,169 91	743 18	9,561 05	10,304 23	1,247 02	1,112 00
Sunderland, . . .	1,125 31	4,230 48	8,526 34	330 19	8,856 53	12,981 01	283 45	83 17	366 62	523 27	236 00
Sutton, . . .	7,639 17	6,025 80	6,305 30	460 31	6,765 61	13,791 41	345 38	203 89	547 27	383 90	5, 11
Swampscott, . . .	19,637 17	21,347 91	15,117 98	3,045 43	18,163 43	39,511 34	283 45	2,043 98	3,190 78	1,535 61	198 50
Swansea, . . .	7,517 25	9,517 27	10,311 25	2,322 05	12,633 30	22,151 07	256 47	297 69	554 16	396 05	228 00
Taunton, . . .	8,265 40	15,197 27	19,743 98	18,792 50	38,536 48	53,733 75	833 16	2,264 15	3,099 31	780 09	2,377 09
Templeton, . . .	6,931 87	15,581 47	15,581 47	670 21	16,251 68	25,588 63	343 24	117 78	461 02	396 05	7, 80
Tewksbury, . . .	1,953 08	9,336 95	15,581 47	670 21	16,251 68	25,588 63	343 24	117 78	461 02	396 05	7, 80
Tisbury, . . .	8,481 79	10,903 20	6,592 80	16,804 34	23,397 14	34,300 34	403 56	2,800 72	3,204 28	1,138 00	8, 30
Tisbury, . . .	4,244 60	4,649 84	2,721 89	5,331 91	8,053 80	12,703 64	209 96	2,762 66	2,972 62	426 41	7,00
Townsend, . . .	405 24	9,680 30	13,200 29	2,136 95	15,337 24	25,017 54	111 84	354 38	406 22	308 56	6, 00
Truro, . . .	674 41	8,021 84	3,793 13	984 37	4,477 50	12,499 34	193 41	216 57	409 98	251 04	193 00
Tyngsborough, . . .	611 18	14,259 13	3,264 23	1,341 38	4,605 61	18,864 74	221 08	193 56	414 64	232 93	6, 03
Uxbridge, . . .	1,531 15	930 23	6,548 29	649 90	7,198 19	13,373 60	225 23	157 36	382 59	305 68	158 00
Wales, . . .	24 11	255 89	486 67	57 32	543 99	799 88	23 18	55 11	78 29	53 65	790 06
Walpole, . . .	15,922 32	17,327 00	40,176 04	4,853 43	45,029 47	62,356 47	279 26	945 88	1,244 14	715 59	52 00
Ware, . . .	1,620 94	9,591 75	816 77	1,055 17	1,871 94	11,463 69	387 78	252 43	640 21	229 64	3,129 05
Wareham, . . .	17,284 69	19,273 09	35,168 41	4,252 52	39,420 93	58,694 02	234 48	501 48	735 96	685 52	4, 18
Warren, . . .	1,137 05	16,098 83	11,241 90	1,155 18	11,306 98	27,495 81	277 54	37 84	315 38	685 52	2,049 95
Watertown, . . .	1,322 26	7,143 05	9,098 74	1,089 28	10,188 02	17,331 07	277 54	37 84	315 38	426 56	8, 48
Wayland, . . .	40,611 22	646 96	8,770 79	22,822 70	31,593 49	72,851 67	250 75	8,846 00	9,096 75	1,011 15	4, 10
Webster, . . .	2,209 35	3,157 25	1,205 71	402 55	1,608 26	4,765 51	365 98	155 42	521 40	1,742 45	1,205 77
Wellesley, . . .	4,380 62	536 74	16,237 50	754 98	16,992 48	21,909 84	454 86	639 81	1,094 67	1,218 57	2, 58
Wellesley, . . .	310 04	8,766 63	3,308 09	579 16	3,887 25	12,563 88	66 80	124 55	191 35	225 96	6, 45
Wenham, . . .	1,317 15	11,295 23	4,412 12	1,251 24	5,663 86	16,959 09	748 38	711 21	1,459 59	613 57	444 90
Westborough, . . .	3,739 25	546 82	1,950 26	748 24	2,698 50	6,984 57	182 89	250 34	433 13	181 56	352 00
West Boylston, . . .	6,968 22	3,657 55	1,143 91	790 70	1,936 61	10,594 16	391 95	183 45	575 40	322 09	2, 99
West Bridgewater, . . .	20,043 34	20,820 38	10,502 12	745 25	11,248 37	32,068 73	245 89	235 83	481 72	707 29	431 00
West Brookfield, . . .	1,096 90	7,882 73	2,001 83	553 95	2,555 78	10,438 51	390 35	193 13	587 48	274 34	316 00
Westfield, . . .	1,081 61	29,599 85	35,256 25	897 32	36,153 42	186 16	154 44	154 44	340 60	635 32	5, 81
Westford, . . .	6,165 25	1,593 14	6,883 23	522 97	7,406 20	15,154 59	321 85	105 65	427 50	299 20	990 00

APPENDIX H.

STATEMENT SHOWING THE NUMBER OF PETITIONS RECEIVED AND THE LENGTH PETITIONED FOR, THE LAYOUTS MADE AND THEIR LENGTH AND DISTRIBUTION IN THE VARIOUS COUNTIES OF THE COMMONWEALTH.

COUNTIES.	PETITIONS RECEIVED.				PETITIONS SITUATED IN —			LAYOUTS MADE IN —			Number of Layouts.
	County.	City.	Town.	Totals.	City.	Town.	Totals.	City.	Town.	Totals.	
Barnstable,	4	—	56	60	—	15	15	—	15	15	128
Berkshire,	18	12	59	89	2	30	32	2	19	21	129
Bristol,	5	8	53	66	3	18	21	3	16	19	123
Dukes,	3	—	6	9	—	6	6	—	6	6	27
Essex,	8	25	61	94	7	26	33	7	20	27	160
Franklin,	2	—	62	64	—	18	18	—	15	15	109
Hampden,	4	6	35	45	3	17	20	2	11	13	88
Hampshire,	2	7	54	63	1	17	18	1	12	13	91
Middlesex,	17	27	111	155	9	44	53	7	35	42	202
Nantucket,	—	—	1	1	—	1	1	—	1	1	14
Norfolk,	4	7	75	86	1	26	27	1	23	24	111
Plymouth,	—	8	69	77	1	25	26	1	20	21	143
Suffolk,	—	8	2	10	3	1	4	3	—	3	10
Worcester,	1	9	171	181	3	56	59	3	44	47	287
Totals,	68	117	815	1,000	33	300	333	30	237	267	1,622

NUMBER OF PETITIONS RECEIVED, ETC. — *Concluded.*

COUNTIES.	LENGTHS PETITIONED FOR.		LENGTHS LAID OUT.					
			1894-1915.		1916.		TOTALS.	
	Feet.	Miles.	Feet.	Miles.	Feet.	Miles.	Feet.	Miles.
Barnstable,	790,319	149.68	620,941	117.60	38,212	7.24	659,153	124.84
Berkshire,	971,731	184.04	523,567	99.17	15,318	2.90	538,885	102.07
Bristol,	895,544	169.61	438,374	83.02	23,093	4.37	461,467	87.39
Dukes,	155,363	29.43	121,449	23.00	—	—	121,449	23.00
Essex,	1,220,307	231.11	488,336	92.48	38,377	7.27	526,713	99.75
Franklin,	724,567	137.23	356,053	67.43	46,345	8.78	402,398	76.21
Hampden,	748,524	141.84	304,861	57.74	100	.02	304,961	57.76
Hampshire,	552,989	104.74	269,576	51.05	145	.03	269,721	51.08
Middlesex,	1,880,900	356.21	751,591	142.35	24,727	4.68	776,318	147.03
Nantucket,	34,185	6.47	34,211	6.48	—	—	34,211	6.48
Norfolk,	1,032,622	195.56	386,804	73.26	1,418	.27	388,222	73.53
Plymouth,	1,135,214	215.00	600,522	113.74	23,651	4.48	624,173	118.22
Suffolk,	75,095	14.23	32,048	6.07	6,899	1.31	38,947	7.38
Worcester,	2,080,579	394.05	886,597	167.92	65,043	12.32	951,640	180.24
Totals,	12,297,939	2,329.20	5,814,930	1,101.31	283,328	53.67	6,098,258	1,154.93

APPENDIX I.

TABLE SHOWING THE WORK DONE UNDER THE "SMALL TOWN" ACT SINCE ITS PASSAGE IN 1900.

* [Section 17, Chapter 47, Revised Laws, and Chapter 279, Acts of 1908.]

TOWNS.	ALLOTMENTS.			LENGTHS BUILT (FEET).			Types of Roads.
	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	
<i>Barnstable County.</i>							
Eastham,	\$4,910 40	\$1,000 00 ¹	\$5,910 40	16,628	3,250	19,878	Grading; sand and oil.
Harwich,	1,300 00	500 00 ²	1,800 00	7,705	- ³	7,705	Sand and oil.
Mashpee,	1,200 00	-	1,200 00	1,944	-	1,944	Sand and oil.
Provincetown,	5,095 56	-	5,095 56	9,930	-	9,930	Macadam.
Truro,	-	5,000 00 ⁴	5,000 00	-	21,300	21,300	Sand and oil.
Wellfleet,	1,653 00	-	1,653 00	2,250	-	2,250	Broken stone and clay.
	\$14,158 96	\$6,500 00	\$20,658 96	38,457	24,550	63,007	
<i>Berkshire County.</i>							
Alford,	\$4,569 00	\$700 00 ⁵	\$5,269 00	11,759	- ³	11,759	Gravel.
Becket,	11,200 00	2,200 00 ⁶	13,400 00	8,280	1,200	9,480	Gravel and macadam.
Cheshire,	750 00	-	750 00	2,500	-	2,500	Gravel.
Clarksburg,	1,380 00	-	1,380 00	2,400	-	2,400	Gravel.
Egremont,	8,232 30	1,000 00 ⁷	9,232 30	18,517	2,400	20,917	Gravel.
Florida,	9,436 00	1,700 00 ⁸	11,136 00	56,446	750	57,196	Gravel and grading.
Hancock,	3,898 39	475 00	4,373 39	8,588	450	9,038	Gravel.
Hinsdale,	8,000 00	700 00 ⁴	8,700 00	7,382	3,900	11,282	Bituminous macadam and gravel.
Lanesborough,	6,802 00	-	6,802 00	5,500	-	5,500	Gravel road and steel concrete bridge.
Monterey,	6,368 00	1,200 00 ⁹	7,568 00	18,201	- ³	18,201	Gravel.
Mount Washington,	4,142 00	750 00 ¹⁰	4,892 00	6,380	- ³	6,380	Gravel and bridge repairs.
New Ashford,	2,561 00	-	2,561 00	2,600	-	2,600	Gravel road and culvert construction and repairs.
	12,863 48	2,000 00 ⁴	14,863 48	38,845	- ³	38,845	Gravel.
New Marlborough,	7,035 92	1,700 00 ¹¹	8,735 92	14,700	- ³	14,700	Gravel.
Otis,							

Peru,	6,691 00	900 00 ⁷	7,591 00	9,345	9,345	Gravel.
Richmond,	7,950 00	3,000 00 ¹²	10,950 00	13,956	13,956	Bituminous gravel and macadam.
Sundsfeld,	11,778 14	1,000 00 ⁷	12,778 14	24,961	26,057	Macadam.
Savoy,	9,805 00	800 00	10,605 00	13,546	13,546	Gravel.
Sheffield,	8,488 00	—	8,488 00	16,182	16,182	Grading and gravel.
Tyringham,	8,965 00	1,700 00 ¹¹	10,665 00	14,450	17,133	Grading and macadam.
Washington,	8,548 00	—	8,548 00	14,420	14,420	Grading and gravel.
West Stockbridge,	9,626 00	1,000 00 ¹³	10,626 00	17,307	17,307	Gravel.
Windsor,	2,500 00	—	2,500 00	1,110	1,110	Macadam.
	\$161,589 23	\$20,825 00	\$182,414 23	327,375	339,854	
<i>Bristol County.</i>						
Berkley,	\$3,000 00	\$1,500 00 ⁴	\$4,500 00	13,000	17,800	Gravel.
Dighton,	1,500 00	—	1,500 00	10,990	10,990	Gravel and oil.
Easton,	12,000 00	—	12,000 00	31,686	31,686	Macadam.
Freetown,	2,350 00	—	2,350 00	—	—	Macadam.
Mansfield,	2,500 00	2,500 00 ¹⁴	5,000 00	3,700	7,588	Bituminous macadam.
Norton,	4,176 00	—	4,176 00	9,850	9,850	Macadam.
Raynham,	3,316 00	—	3,316 00	6,135	6,135	Macadam.
Rehoboth,	8,250 00	1,500 00 ⁴	9,750 00	21,000	21,000	Macadam and gravel.
Westport,	6,400 00	2,500 00 ¹⁵	8,900 00	31,494	43,300	Macadam and bituminous macadam.
	\$43,492 00	\$8,000 00	\$51,492 00	127,855	148,349	
<i>Essex County.</i>						
Boxford,	\$2,261 00	\$1,000 00 ⁴	\$3,261 00	13,694	24,019	Gravel.
Danvers,	7,000 00	—	7,000 00	19,700	19,700	Gravel.
Essex,	1,932 00	—	1,932 00	34,500	34,500	Gravel and repairs.
Georgetown,	2,950 00	—	2,950 00	15,437	15,437	Gravel and macadam.
Groveland,	1,000 00	—	1,000 00	12,740	12,740	Bituminous gravel.
Lynnfield,	2,500 00	—	2,500 00	15,650	15,650	Gravel.
Marblehead,	7,800 00	—	7,800 00	11,008	11,008	Macadam.
Methuen,	500 00	—	500 00	7,500	7,500	Macadam.
Middleton,	3,944 00	—	3,944 00	11,900	11,900	Gravel.
North Andover,	3,000 00	1,000 00 ⁴	4,000 00	13,950	13,950	Gravel.

¹¹ Town contributed \$1,000.
¹² Town contributed \$1,500.
¹³ Town contributed \$200.
¹⁴ Town contributed \$2,925.
¹⁵ Town contributed \$4,515.

⁶ Town contributed \$2,800.
⁷ Town contributed \$500.
⁸ Town contributed \$1,085.
⁹ Town contributed \$800.
¹⁰ Town contributed \$350.

¹ Town contributed \$600.
² Town contributed \$3,000.
³ Work begun, but not completed.
⁴ Town contributed a like amount.
⁵ Town contributed \$300.

WORK DONE UNDER THE "SMALL TOWN" ACT — Continued.

TOWNS.	ALLOTMENTS.			LENGTHS BUILT (FEET).			Types of Roads.
	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	
Berkshire County—Con.							
Rockport,	\$1,000 00	—	\$1,000 00	5,600	—	5,600	Gravel.
Salisbury,	1,948 00	—	1,948 00	2,150	—	2,150	Macadam.
Saugus,	1,200 00	—	1,200 00	900	—	900	Bituminous macadam.
Swampscott,	2,925 00	—	2,925 00	5,200	—	5,200	Macadam.
Topsheld,	4,984 00	—	4,984 00	35,375	—	35,375	Gravel.
West Newbury,	2,200 00	—	2,200 00	3,293	—	3,293	Macadam.
	\$47,144 00	\$2,000 00	\$49,144 00	214,597	4,325	218,922	
Franklin County.							
Ashfield,	\$4,000 00	—	\$4,000 00	10,600	200 ¹	10,800	Gravel.
Barnardston,	2,965 00	—	2,965 00	16,400	—	16,400	Gravel.
Buckland,	2,500 00	—	2,500 00	6,600	—	6,600	Gravel and concrete bridge.
Charlmont,	6,900 00	—	6,900 00	11,254	—	11,254	Gravel and grading.
Colrain,	5,875 00	\$2,300 00 ²	8,175 00	16,250	5,200	21,450	Gravel.
Conway,	9,852 00	—	9,852 00	18,760	—	18,760	Gravel.
Gill,	3,912 00	—	4,712 00	14,275	1,800	16,075	Gravel road and bridge repairs.
Hawley,	4,897 00	750 00 ⁴	5,647 00	15,125	1,450	16,575	Grading and gravel.
Heath,	5,627 00	700 00 ⁵	6,327 00	12,272	— ⁶	12,272	Gravel.
Leverett,	9,076 00	1,150 00 ³	10,226 00	25,229	— ⁷	25,229	Gravel.
Leyden,	5,093 00	400 00	5,493 00	16,950	950	17,900	Gravel.
Monroe,	7,167 04	800 00 ⁸	7,967 04	13,670	— ⁹	13,670	Gravel.
New Salem,	11,002 00	1,900 00 ⁹	12,902 00	20,622	5,950	26,572	Gravel.
Orange,	2,940 67	—	2,940 67	13,225	—	13,225	Gravel and concrete bridge.
Rowe,	7,223 00	600 00	7,823 00	17,266	— ⁷	17,266	Gravel.
Shelburne,	—	2,500 00 ¹⁰	2,500 00	—	7,300	7,300	Gravel.
Shutesbury,	3,934 00	—	3,934 00	10,950	—	10,950	Gravel.
Warwick,	6,220 00	800 00 ⁸	7,020 00	7,700	1,500	9,200	Gravel.
Wendell,	11,338 00	1,250 00 ¹¹	12,588 00	20,200	— ⁶	20,200	Grading and gravel.
Whately,	5,200 00	—	5,200 00	6,050	—	6,050	Macadam.
	\$115,721 71	\$13,950 00	\$129,671 71	273,398	24,350	297,748	

Hampden County.

Blandford,	\$16,235 16	—	\$16,235 16	9,010	—	9,010	Grading and gravel.
Brimfield,	5,600 00	\$2,000 00 ¹²	7,600 00	10,270	3,000	13,270	Gravel.
Chester,	3,871 43	1,500 00 ¹³	5,371 43	8,451	2,150	10,601	Gravel.
East Longmeadow,	7,863 75	—	7,863 75	19,510	—	19,510	Gravel and macadam.
Granville,	11,623 00	800 00	12,423 00	25,050	—	25,050	Grading and gravel.
Hamptden,	6,708 00	800 00 ¹⁴	7,508 00	43,348	—	43,348	Gravel.
Holland,	1,614 00	400 00	2,014 00	4,032	500	4,532	Grading and gravel.
Longmeadow,	1,200 00	—	1,200 00	1,425	—	1,425	Macadam and concrete culvert.
Ludlow,	2,651 00	2,500 00 ¹⁵	5,151 00	—	—	—	Gravel.
Monson,	3,300 00	1,500 00 ²	4,800 00	—	—	—	Macadam and gravel.
Montgomery,	2,620 00	—	2,620 00	4,001	—	4,001	Gravel.
Russell,	2,693 85	—	2,693 85	2,086	—	2,086	Grading and bituminous macadam.
Southwick,	8,628 00	1,000 00 ³	9,628 00	27,758	1,903	29,661	Gravel.
Tolland,	7,192 06	1,200 00 ³	8,392 06	9,112	2,300	11,412	Grading, gravel and concrete culvert.
Wilbraham,	2,900 00	1,500 00 ¹⁶	4,400 00	—	6,000	6,000	Gravel.
	\$84,700 25	\$13,200 00	\$97,900 25	170,843	15,853	186,696	

Hampshire County.

Amherst,	\$6,800 00	—	\$6,800 00	6,505	—	6,505	Water-bound and bituminous macadam.
Belchertown,	1,000 00	—	1,000 00	1,200	—	1,200	Gravel.
Chesterfield,	9,009 52	\$1,000 00 ⁵	10,009 52	12,301	900	13,201	Gravel and concrete bridge.
Cummington,	4,233 00	—	4,233 00	9,900	—	9,900	Gravel.
Easthampton,	2,000 00	—	2,000 00	2,430	—	2,430	Macadam.
Enfield,	9,170 56	1,700 00 ¹³	10,870 56	36,410	—	36,410	Gravel.
Goshen,	1,400 00	—	1,400 00	1,800	—	1,800	Gravel.
Greenwich,	6,001 00	950 00 ³	6,951 00	15,500	3,350	18,850	Gravel.
Hadley,	11,500 00	—	11,500 00	12,850	—	12,850	Macadam.
Hatfield,	5,000 00	—	5,000 00	7,865	—	7,865	Macadam.
Huntington,	5,050 00	—	5,050 00	10,025	—	10,025	Gravel.
Middlefield,	3,810 00	750 00 ¹⁴	4,560 00	9,008	—	9,008	Gravel.
Pelham,	7,926 00	950 00 ¹¹	8,876 00	11,550	—	11,550	Gravel and macadam.
Plainfield,	5,580 00	500 00 ⁴	6,080 00	8,374	1,500	9,874	Gravel.
Prescott,	6,678 50	900 00 ¹⁷	7,578 50	14,180	1,750	15,930	Grading and gravel.

¹ Built with 1915 allotment.² Town contributed a like amount.³ Town contributed \$500.⁴ Town contributed \$100.⁵ Town contributed \$200.⁶ Work begun, but not completed.⁷ Work not yet begun.⁸ Town contributed \$400.⁹ Town contributed \$1,500.¹⁰ Town contributed \$5,665.¹¹ Town contributed \$250.¹² Town contributed \$1,130.¹³ Town contributed \$1,000.¹⁴ Town contributed \$300.¹⁵ Town contributed \$5,000.¹⁶ Town contributed \$1,680.¹⁷ Town contributed \$450.

WORK DONE UNDER THE "SMALL TOWN" ACT — *Continued.*

TOWNS.	ALLOTMENTS.			LENGTHS BUILT (FEET).			Types of Roads.
	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	
Franklin County—Con.							
Southampton,	\$5,523 83	—	\$5,523 83	11,613	—	11,613	Gravel.
Westhampton,	7,418 35	\$850 00 ¹	8,268 35	18,203	1,200	19,403	Gravel.
Williamsburg,	3,950 00	177 25 ²	4,127 25	8,950	— ³	8,950	Macadam.
Worthington,	10,677 00	—	10,677 00	21,243	—	21,243	Gravel.
	\$112,721 76	\$7,777 25	\$120,499 01	219,907	8,700	228,607	
Middlesex County.							
Ashby,	\$1,000 00	—	\$1,000 00	2,150	—	2,150	Macadam.
Ayer,	4,000 00	—	4,000 00	17,600	—	17,600	Gravel.
Bedford,	4,500 00	—	4,500 00	5,100	—	5,100	Macadam.
Belmont,	2,300 00	—	2,300 00	5,237	—	5,237	Macadam.
Billerica,	8,484 00	—	8,484 00	10,500	—	10,500	Macadam and bituminous macadam.
Boxborough,	2,100 00	\$700 00 ¹	2,800 00	8,200	1,300	9,500	Gravel.
Burlington,	8,100 00	—	8,100 00	16,009	—	16,009	Macadam.
Carlisle,	5,136 00	—	5,136 00	18,437	—	18,437	Gravel.
Dracut,	12,989 13	—	12,989 13	10,419	—	10,419	Macadam and bituminous macadam.
Dunstable,	4,199 00	400 00	4,599 00	25,450	— ⁴	25,450	Gravel.
Framingham,	4,000 00	—	4,000 00	4,200	—	4,200	Macadam.
Hopkinton,	2,000 00	—	2,000 00	3,400	—	3,400	Gravel.
Hudson,	7,000 00	—	7,000 00	20,557	—	20,557	Grading and gravel.
Littleton,	2,012 00	—	2,012 00	4,492	—	4,492	Gravel.
Maynard,	9,383 89	—	9,383 89	15,233	—	15,233	Grading, macadam and bridge repairs.
North Reading,	14,500 00	—	14,500 00	29,178	—	29,178	Macadam.
Pepperell,	1,000 00	700 00 ²	1,700 00	4,050	2,250	6,300	Gravel.
Reading,	6,632 00	—	6,632 00	7,120	—	7,120	Macadam and bituminous macadam.
Sherborn,	6,558 00	—	6,558 00	33,900	—	33,900	Gravel.
Shirley,	7,584 00	—	7,584 00	29,850	—	29,850	Gravel and bituminous macadam.
Stow,	6,145 00	—	6,145 00	37,627	—	37,627	Gravel and macadam.
Townsend,	2,293 05	300 00 ⁵	2,593 05	8,342	750	9,092	Gravel.
Wakefield,	5,150 00	—	5,150 00	6,986	—	6,986	Macadam.

Wayland,	1,449 50	-	-	1,449 50	1,175	-	-	1,175	Bituminous macadam.
Westford,	2,366 30	-	-	2,366 30	5,400	-	-	5,400	Gravel.
Wilmington,	1,000 00	-	-	1,000 00	1,200	-	-	1,200	Bituminous macadam.
Norfolk County.									
Avon,	\$131,881 87	\$2,100 00	-	\$133,981 87	331,812	4,300	336,112	8,745	Gravel and macadam.
Bellingham,	\$3,369 00	-	-	\$3,369 00	8,745	-	-	14,365	Macadam and gravel.
Foxborough,	4,412 00	\$500 00 ²	-	4,412 00	14,365	6,569	14,473	2,830	Gravel.
Holbrook,	1,474 92	-	-	1,974 92	7,904	-	-	720	Gravel.
Medfield,	800 00	-	-	800 00	2,830	-	-	13,106	Macadam.
Medway,	1,040 00	-	-	1,040 00	720	-	-	14,150	Macadam and gravel.
Millis,	5,328 00	-	-	5,328 00	13,106	-	-	5,050	Gravel.
Needham,	5,136 00	-	-	5,136 00	14,150	1,200	1,200	8,870	Bituminous macadam.
Norfolk,	2,500 00	1,000 00 ⁶	-	3,500 00	3,850	-	-	13,226	Gravel.
Norfolk,	1,500 00	-	-	1,500 00	8,870	4,278	4,278	95,535	Macadam.
Sharon,	4,250 00	2,000 00 ²	-	6,250 00	8,948	-	-	5,760	Macadam.
Plymouth County.									
Abington,	\$29,809 92	\$3,500 00	-	\$33,309 92	83,488	12,047	95,535	3,590	Surfacing.
Bridgegewater,	\$2,600 00	-	-	\$2,600 00	5,760	-	-	59,615	Macadam and bituminous gravel.
Carver,	576 20	-	-	576 20	3,590	4,330	4,330	3,600	Gravel.
Duxbury,	20,790 00	\$2,500 00 ²	-	23,290 00	55,285	-	-	22,149	Macadam and bituminous macadam.
East Bridgegewater,	500 00	-	-	500 00	3,600	8,800	8,800	2,827	Macadam.
Halifax,	10,142 87	3,700 00 ³	-	13,842 87	22,149	-	-	50,900	Macadam.
Halifax,	8,004 00	-	-	8,004 00	14,655	-	-	21,181	Macadam and gravel.
Hanover,	2,048 82	-	-	2,048 82	2,827	-	-	3,600	Gravel and macadam.
Hanson,	18,597 25	2,000 00 ²	-	20,597 25	50,900	-	-	38,033	Sand and oil.
Lakeville,	6,200 00	-	-	6,200 00	21,181	3,600	3,600	35,675	Macadam and gravel.
Marshfield,	-	3,500 00 ²	-	3,500 00	-	14,330	14,330	32,572	Macadam.
Norwell,	6,380 00	2,500 00 ³	-	8,880 00	19,111	-	-	4,702	Sand and oil, and bituminous macadam.
Pembroke,	7,823 45	-	-	7,823 45	38,033	-	-	9,540	-
Plymouth,	1,000 00	-	-	1,000 00	2,000	3,000	3,000	-	-
Plymouth,	5,867 00	1,000 00 ¹⁰	-	6,867 00	32,675	-	-	-	-
Rochester,	7,500 00	-	-	7,500 00	32,572	-	-	-	-
Rockland,	2,125 00	-	-	2,125 00	4,702	-	-	-	-
Wareham,	3,737 59	-	-	3,737 59	9,540	-	-	-	-
West Bridgegewater,	-	3,000 00 ²	-	3,000 00	-	-	-	-	-
	\$103,892 18	\$18,200 00	-	\$122,092 18	318,580	34,060	352,640	-	-

¹ Town contributed \$300.

² Town contributed a like amount.

³ Allotment to complete 1914 work.

⁴ Work begun, but not completed.

⁵ Town contributed \$600.

⁶ Town contributed \$1,085.

⁷ Town contributed \$2,800.

⁸ Town contributed \$3,000.

⁹ Town contributed \$5,000.

¹⁰ Town contributed \$400.

¹¹ Work not yet begun.

⁹ Town contributed \$5,000.¹⁰ Town contributed \$400.¹¹ Work not yet begun.⁵ Town contributed \$600.⁶ Town contributed \$1,085.⁷ Town contributed \$2,800.⁸ Town contributed \$3,000.¹ Town contributed \$300.² Town contributed a like amount.³ Allotment to complete 1914 work.⁴ Work begun, but not completed.

WORK DONE UNDER THE "SMALL TOWN" ACT — *Concluded.*

TOWNS.	ALLOTMENTS.			LENGTHS BUILT (FEET).			Types of Roads.
	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	
<i>Worcester County.</i>							
Ashburnham,	\$9,594 00	—	\$9,594 00	26,715	—	26,715	Gravel.
Berlin,	7,524 00	\$600 00 ¹	8,124 00	25,458	— ²	25,458	Gravel.
Bolton,	9,364 00	1,600 00 ³	10,964 00	45,838	— ²	45,838	Gravel.
Boyiston,	5,569 00	—	5,569 00	18,590	—	18,590	Gravel.
Brookfield,	900 00	—	900 00	2,500	—	2,500	Macadam.
Dana,	7,669 00	1,450 00 ³	9,119 00	20,812	1,000	21,812	Gravel.
Douglas,	1,500 00	—	1,500 00	4,500	—	4,500	Macadam.
Hardwick,	10,500 00	—	10,500 00	21,950	—	21,950	Macadam.
Harvard,	2,200 00	5,000 00 ⁴	7,200 00	2,875	— ²	2,875	Macadam.
Holden,	1,200 00	—	1,200 00	1,600	—	1,600	Gravel.
Hubbardston,	8,885 00	3,550 00 ⁵	12,435 00	21,925	5,738	27,663	Gravel.
Mendon,	7,039 00	1,000 00 ⁶	8,039 00	22,842	1,675	24,517	Gravel and repairs.
Millbury,	3,000 00	—	3,000 00	3,145	—	3,145	Macadam and bituminous macadam.
New Brantree,	2,500 00	—	2,500 00	5,425	—	5,425	Macadam and gravel.
Northborough,	—	2,000 00 ⁴	2,000 00	—	2,155	2,155	Bituminous macadam.
North Brookfield,	2,000 00	—	2,000 00	—	2,400 ⁷	2,400	Macadam.
Oakham,	9,318 00	700 00 ⁸	10,018 00	25,580	650	26,230	Gravel and macadam.
Oxford,	4,600 00	—	4,600 00	13,698	—	13,698	Gravel and bituminous macadam.
Paxton,	5,200 00	—	5,200 00	16,843	— ⁹	16,843	Gravel.
Petersham,	11,310 00	—	11,310 00	22,198	—	22,198	Gravel.
Phillipston,	3,050 00	1,600 00 ³	4,650 00	33,390	— ²	33,390	Gravel.
Princeton,	6,143 12	—	6,143 12	6,828	—	6,828	Macadam.
Royalston,	4,500 00	1,800 00 ³	6,300 00	14,500	— ²	14,500	Gravel.
Rutland,	5,954 00	—	5,954 00	9,081	—	9,081	Gravel and macadam.
Shrewsbury,	3,800 00	—	3,800 00	8,400	—	8,400	Gravel.
Southbridge,	9,125 00	2,000 00 ¹⁰	11,125 00	5,993	2,800	8,793	Vitrified paving brick (paved) and bituminous macadam.
Spencer,	3,500 00	—	3,500 00	—	5,487 ⁷	5,487	Granite block paving and bituminous macadam.

Sturbridge,	.	.	.	.	3,950 00	2,000 00 ³	5,950 00	5,683	3,400	9,083	Gravel.
Templeton,	.	.	.	.	2,000 00	1,621 70 ³	3,621 70	7,800	- ¹¹	7,800	Gravel.
Westborough,	.	.	.	.	5,500 00	2,000 00 ⁴	7,500 00	11,177	2,500	13,677	Gravel and macadam.
West Brookfield,	.	.	.	.	4,950 00	-	4,950 00	4,416	-	4,416	Bituminous macadam.
Westminster,	.	.	.	.	500 00	-	500 00	2,050	-	2,050	Gravel.
Winchendon,	.	.	.	.	9,000 00	-	9,000 00	26,010	-	26,010	Gravel.
					\$171,835 12	\$27,921 70	\$199,756 82	437,822	27,805	465,627	

¹ Town contributed \$400.² Work begun, but not completed.³ Town contributed \$1,000.⁴ Town contributed a like amount.⁵ Town contributed \$2,400.⁶ Town contributed \$500.⁷ Built with 1915 allotment.⁸ Town contributed \$200.⁹ Work not yet begun.¹⁰ Town contributed \$3,000.¹¹ Allotment used for oiling 7,800 feet improved in 1915.

SUMMARY.

COUNTIES.	ALLOTMENTS.			LENGTHS BUILT (FEET).		
	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.	Previous to 1916.	In 1916.	Total to Nov. 30, 1916.
Barnstable,	\$14,158 96	\$6,500 00	\$20,658 96	38,457	24,550	63,007
Berkshire,	161,589 23	20,825 00	182,414 23	327,375	12,479	339,854
Bristol,	43,492 00	8,000 00	51,492 00	127,855	20,494	148,349
Essex,	47,144 00	2,000 00	49,144 00	214,597	4,325	218,922
Franklin,	115,721 71	13,950 00	129,671 71	273,398	24,350	297,748
Hampden,	84,700 25	13,200 00	97,900 25	170,843	15,853	186,696
Hampshire,	112,721 76	7,777 25	120,499 01	219,907	8,700	228,607
Middlesex,	131,881 87	2,100 00	133,981 87	331,812	4,300	336,112
Norfolk,	29,809 92	3,500 00	33,309 92	83,488	12,047	95,535
Plymouth,	103,892 18	18,200 00	122,092 18	318,580	34,060	352,640
Worcester,	171,835 12	27,921 70	199,756 82	437,822	27,805	465,627
	\$1,016,947 00	\$123,973 95	\$1,140,920 95	2,544,134	188,963	2,733,097

APPENDIX J.

APPROPRIATIONS.

Appropriations for the Construction and Repair of State Highways.

1894, chapter 497, section 8,	\$300,000 00
1895, chapter 347, section 3,	400,000 00
1896, chapter 481, section 3,	600,000 00
1897, chapter 340, section 1,	800,000 00
1898, chapter 539, section 1,	400,000 00
1899, chapter 396, section 1,	500,000 00
1900, chapter 442, section 1,	500,000 00
1901, chapter 269, section 1,	500,000 00
1902, chapter 246, section 1,	500,000 00
1903, chapter 280, section 1,	2,250,000 00 ¹
1907, chapter 446, section 1,	2,250,000 00 ¹
1912, chapter 704, section 1,	5,000,000 00 ¹
	\$14,250,000 00

Appropriations for the Salaries and Expenses of the Commission, paid from the Treasury of the Commonwealth.

1898, chapter 497, section 1,	\$14,300 00
1899, chapter 367, section 1,	28,500 00
1900, chapter 141, section 1,	28,500 00
1901, chapter 451, section 1,	33,750 00
1902, chapter 67, section 1,	33,750 00
1903, chapters 14 and 485, section 1,	43,950 00 ²
1904, chapters 19 and 461, section 1,	39,300 00 ²
1905, chapters 36, 431 and 480, section 1,	46,150 00 ²
1906, chapters 36 and 140, section 1,	49,514 14 ²
1907, chapter 157, section 1,	66,950 00 ³
1908, chapter 212, section 1,	76,300 00 ³

¹ To cover expenses of construction for a period of five years.

² Includes expenses of automobile department.

³ Includes expenses of moth suppression and automobile department in part.

1909, chapter 127,	\$47,300 00 ¹
1910, chapter 139,	56,250 00 ¹
1911, chapter 555, section 1,	61,250 00 ¹
1912, chapter 287, section 1,	61,500 00 ¹
1913, chapter 35, section 1,	98,500 00 ²
1914, chapter 236, section 1,	105,500 00 ²
1915, Special, chapter 183, section 1,	104,500 00 ²
1916, Special, chapter 208, section 1,	103,550 00 ²

¹ Includes expense of moth suppression.

² Includes expense of moth suppression and maintenance of Fall River and Newburyport bridges.

APPENDIX K.

ROAD STATISTICS IN CITIES AND TOWNS.
Barnstable County.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Barnstable,	\$9,852,706	190	\$51,856	\$57,400 00	\$5 82	\$2,000	\$3 60	\$5 20	\$2 00	\$1,200 00	\$18 10
Bourne,	8,006,908	106	75,536	20,275 00	2 53	1,500	4 00	5 75	2 25	1,000 00	12 40
Brewster,	1,555,568	57	27,290	4,896 00	3 14	1,500	4 00	6 00	2 00	-	16 00
Chatham,	2,161,582	50	43,231	5,750 00	2 66	700	3 60	5 20	2 00	600 00	13 50
Dennis,	1,099,450	65	26,145	8,150 00	4 79	-	-	-	-	-	20 00
Eastham,	591,829	45	13,151 ¹	1,200 00	2 02	-	-	-	-	-	15 50
Falmouth,	17,867,525	122	146,455	47,350 00	2 65	9,000	4 25	6 25	2 25	2,200 00	10 20
Harwich,	1,936,961	80	24,212	9,935 00	5 12	1,250	4 00	6 00	2 00	-	18 00
Mashpee,	368,035	55	6,691 ¹	1,000 00	2 71	-	-	-	-	-	25 50
Orleans,	9,473,933	33	287,088	9,440 00	99	3,900	3 60	5 20	2 00	-	4 50
Provincetown,	2,663,828	12	221,985	6,918 00	2 59	200	5 00	6 00	2 00	650 00	22 00

Sandwich,	1,692,566	80	21,157	4,241 00	2 50	400	-	5 00	2 00	-	23 30
Turo,	580,070	70	8,286	2,750 00	4 74	100	-	-	2 00	-	15 00
Wellfleet,	908,666	42	21,634	1,732 00	1 90	-	3 52	5 00	2 00	-	18 00
Yarmouth,	2,956,631	69	42,849	4,819 30	1 63	2,500	3 60	5 20	2 00	-	15 20
	\$62,316,258	1,115	-	\$185,856 30	-	-	-	-	-	-	-

County mile value, \$55,889. Average appropriation throughout county per thousand of valuation, \$2.98.

Berkshire County.

Adams,	\$9,002,279	52	\$173,121	\$43,500 00	\$4 83	\$5,000	-	\$5 75	\$2 50	\$1,560 00	\$20 00
Alford,	233,760	21	11,036	800 00	3 42	200	-	4 00	2 00	-	18 90
Becket,	902,800	81	11,145	4,500 00	4 98	300	-	5 00	2 00	-	18 00
Cheshire,	1,116,806	68	16,423	3,150 00	2 82	300	\$3 00	4 00	1 75	-	16 00
Clarksburg,	365,171	15	24,344	10,057 00	2 75	300	3 00	4 50	1 80	-	23 00
Dalton,	7,563,226	35	216,092	17,000 00	2 24	-	3 60	5 00	2 18	-	13 80
Egremont,	654,692	36	18,186	2,750 00	4 20	250	-	5 00	2 00	-	14 00
Florida,	533,261	51	11,436	4,000 00	6 85	500	3 12	4 50	1 75	-	15 00
Great Barrington,	8,026,664	82	97,886	33,594 00	4 18	5,000	3 00	5 00	2 00	-	13 20
Hancock,	508,880	25	20,355	3,500 00	6 89	200	-	5 00	2 00	-	15 80
Hinsdale,	898,016	33	27,212	3,675 00	4 09	300	-	4 00	2 00	-	17 70
Lanesborough,	897,353	53	16,365 ¹	2,500 00	2 88	-	-	-	-	-	20 00

¹ Estimated.

Berkshire County — Concluded.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Lee,	\$3,851,745	61	\$63,143	\$9,986 00	\$2 59	\$2,500	-	\$5 00	\$2 50	-	\$23 00
Lenox,	10,724,198	55	194,985	1,850 00	17	300	-	4 00	1 75	-	16 00
Monterey,	442,994	48	9,229 ¹	1,500 00	3 38	-	-	-	-	-	15 00
Mount Washington,	175,195	21	8,342 ¹	1,500 00	8 57	-	-	-	-	-	15 50
New Ashford,	85,000	13	6,538 ¹	800 00	9 41	-	-	-	-	-	21 50
New Marlborough,	1,002,600	102	9,829	7,636 00	7 61	300	-	4 50	1 75	-	20 00
North Adams,	18,077,919	67	269,819	27,900 00	1 54	22,520	\$3 50	4 50	2 00	\$1,200 00	21 10
Otis,	351,154	60	5,852	3,600 00	10 25	400	-	5 00	2 25	-	20 30
Peru,	210,107	45	4,669	2,025 00	9 63	300	-	4 50	2 00	-	17 50
Pittsfield,	45,025,662	153	294,285 ¹	165,000 00	3 66	-	-	-	-	-	22 60
Richmond,	839,153	63	13,319	2,950 00	3 51	2,775	-	6 00	2 00	-	25 30
Sandisfield,	491,833	100	4,918	3,750 00	7 62	550	3 00	4 50	1 75	-	22 00
Savoy,	251,350	63	3,989	1,750 00	6 96	500	-	4 00	1 75	-	28 00
Sheffield,	1,025,083	100	10,256	7,754 00	4 74	100	-	4 00	1 75	-	17 50
Stockbridge,	6,271,692	44	142,538	15,500 00	2 47	1,000	3 50	5 00	2 00	-	16 80
Tyringham,	467,456	29	16,119	2,200 00	4 70	1,200	-	5 00	2 00	-	18 80
Washington,	376,000	51	7,372	1,800 00	4 78	200	3 00	5 00	2 00	-	19 00

West Stockbridge,	667,513	45	14,833 ¹	3,000 00	4 49	-	-	-	22 50
Williamstown,	6,223,944	67	92,894 ¹	20,000 00	3 21	-	-	-	14 50
Windsor,	390,000	82	4,756	1,900 00	4 87	200	4 50	2 00	21 40
	\$128,274,106	1,825	-	\$411,436 00	-	-	-	-	-

County mile value, \$70,287. Average appropriation throughout county per thousand of valuation, \$3.20.

Bristol County.

Acushnet,	\$1,536,539	31	\$49,567	\$6,000 00	\$3 90	\$3,750	-	\$4 50	\$2 00	-	\$26 00
Attleboro,	23,294,074	90	258,823	52,455 00	2 25	26,000	\$3 50	5 00	2 25	\$4 00 ²	19 80
Berkley,	655,602	49	13,379	3,000 00	4 57	-	-	-	-	-	16 50
Dartmouth,	6,967,455	112	62,209	34,000 00 ¹	4 88	-	-	-	-	-	22 00
Dighton,	2,018,148	45	44,847	5,000 00 ¹	2 47	-	-	-	-	-	18 80
Easton,	11,820,902	63	137,633	23,000 00	1 94	12,000	3 90	5 50	2 40	25 00 ³	13 80
Fairhaven,	5,063,748	38	133,256	15,290 00	3 01	5,000	3 20	4 80	2 00	-	21 00
Fall River,	115,614,540	148	781,179	519,000 00	4 48	55,861	3 75	6 00	30 ⁴	3,000 00	21 20
Freetown,	1,373,930	67	20,506	2,000 00	1 45	-	-	-	-	-	18 30
Mansfield,	5,598,355	65	86,128	12,800 00	2 28	-	-	5 50	2 00	1,000 00	20 00
New Bedford,	121,294,196	145	836,511	239,709 00	1 97	12,400	3 50	5 50	2 50	3,000 00	23 00
North Attleborough,	10,582,704	91	116,293	31,969 00	3 02	9,000	3 50	5 50	2 25	1,000 00	22 00
Norton,	1,900,169	65	29,233	7,620 00	4 01	300	3 20	5 00	1 80	-	20 40
Raynham,	1,234,200	50	24,634	2,700 00	2 18	500	2 80	4 00	1 60	-	13 70
Rehoboth,	1,133,262	107	11,058	9,304 00	7 86	300	3 50	4 50	2 00	-	17 10

¹ Estimated.

² Day.

³ Week.

⁴ Hour.

Bristol County — Concluded.

NAME.	Valuation	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Seekonk,	\$2,007,571	52	\$40,337 ¹	\$9,000 00	\$4 29	-	-	-	-	-	\$16 50
Somerset,	2,037,067	27	75,446	9,553 00	4 68	\$100	\$3 50	\$5 00	\$1 75	-	22 00
Swansea,	2,246,604	49	45,849	12,500 00	5 51	5,000	3 50	5 00	1 75	\$3 00 ²	21 40
Taunton,	31,614,954	149	212,113	97,763 00 ¹	3 09	-	-	-	-	-	20 40
Westport,	2,907,608	110	26,432	20,000 00 ¹	6 88	-	-	-	-	-	19 60
	\$351,041,678	1,556	-	\$1,112,663 00	-	-	-	-	-	-	-

County mile value, \$225,665. Average appropriation throughout county per thousand of valuation, \$3.16.

Dukes County.

Chilmark,	\$405,394	34	\$405,394	\$900 00	\$2 22	\$125	\$3 50	\$5 00	\$2 00	-	\$8 00
Edgartown,	1,419,015	30	47,300	3,450 00	2 43	200	5 00	6 00	2 00	-	20 40
Gay Head,	45,090	3	15,030 ¹	200 00	4 ³³	-	-	-	-	-	10 30
Gosnold,	805,570	1	805,570	50 00	06	-	-	-	-	-	8 00
Oak Bluffs,	2,001,925	31	64,578 ¹	6,000 00	2 99	-	-	-	-	-	23 00
Tisbury,	2,151,406	14	153,071	5,526 00	2 55	1,300	3 50	5 00	2 00	-	14 00
West Tisbury,	603,559	49	13,542	700 00	1 06	150	3 50	5 00	2 00	-	6 00
	\$7,401,959	163	-	\$16,826 00	-	-	-	-	-	-	-

County mile value, \$45,962. Average appropriation throughout county per thousand of valuation, \$2.24.

Essex County — Concluded.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day.)	Salary of Superintendent (per Year).	Tax Rate.
Nahant,	\$11,400,072	11	\$1,030,370 ¹	\$18,000 00	\$1 57	-	-	-	-	-	\$12 00
Newbury,	2,561,304	43	59,565	9,000 00	3 51	\$300	\$3 20	\$4 40	\$2 00	-	9 00
Newburyport,	13,604,158	68	200,061	9,521 93	69	-	-	-	-	\$1,500 00	19 20
North Andover,	7,267,007	100	72,670	22,000 00	3 02	-	-	-	2 25	1,800 00	22 00
Peabody,	17,441,218	54	322,985	34,219 00	1 94	21,445	4 75	6 00	2 50	1,400 00	22 60
Rockport,	4,314,661	27	150,802	12,620 00	2 92	5,000	4 00	6 00	2 40	800 00	18 00
Rowley,	2,544,100	40	63,602	4,688 00	1 84	500	-	5 00	2 00	-	10 00
Salem,	46,481,110	62	749,695	146,000 00	3 14	-	-	6 00	2 50	1,800 00	22 90
Salisbury,	1,803,791	35	51,536 ¹	12,000 00	6 65	-	-	-	-	-	21 20
Saugus,	7,371,553	81	91,006 ¹	18,000 00	2 44	-	-	-	-	-	24 30
Swampscott,	18,273,334	28	652,619	46,395 00	2 53	23,200	4 00	6 00	3 00	1,500 00	20 00
Topsfield,	4,988,125	41	121,661	10,500 00	2 10	-	4 25	6 00	2 50	-	7 70
Wenham,	4,058,458	20	202,922	10,000 00	2 46	-	-	-	-	-	8 80
West Newbury,	1,308,863	44	29,746	3,209 00	2 45	50	3 20	4 40	2 00	-	20 00
	\$558,334,064	1,936	-	\$1,285,634 00	-	-	-	-	-	-	-

County mile value, \$288,395. County appropriation per thousand, \$2.30.

Franklin County.

	\$1,022,975	86	\$11,895	\$5,150 00	\$5 03	\$200	-	\$5 00	\$2 00	-	\$20 00
Ashfield,	.	.	.	.	.	.	-	5 00	2 00	-	19 50
Bernardston,	682,766	59	11,572	1,812 00	2 65	250	-	5 00	2 00	-	16 00
Buckland,	2,131,249	45	47,361	4,558 00	2 13	200	-	5 00	1 75	-	24 00
Charlmont,	664,458	55	12,081	3,200 00	4 81	300	-	4 50	2 25	-	25 00
Colrain,	1,084,927	86	12,615	5,300 00	4 88	200	-	5 00	2 00	-	18 40
Conway,	970,861	90	10,787	3,400 00	3 50	300	-	4 50	1 75	-	17 80
Deerfield,	2,822,082	68	41,501	5,805 00	2 05	1,000	\$3 00	5 00	2 00	-	15 60
Erving,	1,625,897	28	58,067	3,162 00	1 94	300	4 00	4 50	1 80	-	16 60
Gill,	549,725	34	16,168	2,050 00	3 73	200	3 25	4 80	2 50	\$21 00 ²	18 40
Greenfield,	15,804,886	64	246,961	45,000 00	2 84	4,000	3 60	3 50	1 75	-	26 50
Hawley,	277,852	55	5,051	2,050 00	7 40	200	-	4 50	2 00	-	21 00
Heath,	350,405	55	6,371	2,300 00	6 57	200	-	4 00	1 75	-	22 50
Leverett,	440,657	40	11,016	2,300 00	5 22	200	-	4 00	2 00	-	24 00
Leyden,	282,464	32	8,827	1,000 00	3 57	150	-	4 50	1 80	-	20 00
Monroe,	420,000	24	17,500	1,400 00	3 33	100	-	5 00	2 00	750 00	15 30
Montague,	6,764,685	95	71,207	17,950 00	2 65	-	-	5 00	2 00	-	22 00
New Salem,	459,403	80	5,743	2,000 00	4 35	200	-	5 00	2 00	-	22 00
Northfield,	1,838,500	75	24,513	12,700 00	6 90	-	-	5 00	2 00	-	22 00
Orange,	5,126,915	80	64,086	7,200 00	1 43	-	-	-	-	-	22 00

2 Week.

Estimated.

Estimated.

Franklin County — Concluded.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day)	Salary of Superintendent (per Year).	Tax Rate.
Rowe,	\$349,719	48	\$7,285	\$1,850 00	\$5 01	-	-	\$5 00	\$2 00	-	\$22 50
Shelburne,	2,109,237	47	44,877	4,400 00	2 08	\$400	\$3 00	5 00	2 00	-	18 00
Shutesbury,	420,000	50	8,400	1,425 00	3 39	600	-	5 00	-	-	16 00
Sunderland,	931,886	33	24,523	6,200 00	6 66	100	-	5 00	2 50	-	20 80
Warwick,	513,355	70	7,333	4,060 00	7 91	50	-	5 00	1 80	-	21 50
Wendell,	600,138	58	10,347	2,720 00	4 53	400	-	4 00	1 75	-	16 00
Whately,	888,997	43	20,674	1,800 00	2 02	500	3 75	5 50	2 00	-	26 50
	\$49,134,099	1,507	-	\$150,702 00	-	-	-	-	-	-	-

County mile value, \$32,603. Average appropriation throughout county per thousand valuation, \$3.06.

Hampden County.

Agawam,	\$3,590,615	57	\$62,993	\$8,000 00	\$2 22	\$2,500	-	\$5 50	\$2 40	\$4 00 ¹	\$21 20
Blandford,	817,659	98	8,343	5,350 00	6 54	300	-	5 50	2 25	3 25 ¹	20 25
Brimfield,	890,522	66	13,492	3,775 00	4 28	250	-	5 00	2 00	-	18 25
Chester,	997,735	80	12,471	4,625 00	4 63	150	\$4 00	5 00	2 00	-	22 00

Chicopee,	23,913,350	79	302,700	92,200 00	3 85	12,000	4 00	6 00	2 50	1,500 00	18 70
East Longmeadow,	1,551,623	39	39,785	4,480 00	2 88	300	-	5 00	2 25	3 00 ¹	20 00
Granville,	680,518	80	8,506 ²	5,000 00	7 35	-	-	-	-	-	22 00
Hampden,	551,758	32	551,744	2,200 00	3 99	100	-	4 50	2 00	-	17 00
Holland,	150,603	30	5,020	550 00	3 66	300	3 50	4 00	1 60	-	18 80
Holyoke,	73,746,051	120	614,550	188,000 00	2 54	30,000	4 25	6 00	2 25	2,000 00	18 40
Longmeadow,	3,911,379	34	115,040	6,460 00	1 65	-	-	5 50	2 60	4 00 ¹	13 70
Ludlow,	5,832,307	70	83,318	19,300 00	3 31	3,000	-	5 50	2 25	3 25 ¹	15 60
Monson,	2,812,914	127	22,148	8,000 00	2 84	1,000	-	5 00	2 00	-	20 50
Montgomery,	200,000	30	6,666	825 00	4 12	100	-	5 00	1 75	-	20 00
Palmer,	6,206,164	95	65,328	10,580 00	1 70	1,000	3 50	4 50	1 75	4 00 ¹	23 70
Russell,	2,433,102	27	90,117	3,967 00	1 63	150	3 25	5 00	2 25	3 00 ¹	15 00
Southwick,	1,031,641	60	17,194	5,400 00	5 23	100	-	5 25	2 25	600 00	18 50
Springfield,	203,417,211	167	1,218,067	445,913 00	2 19	10,785	3 76	5 60	2 40	4,000 00	17 80
Tolland,	310,000	41	7,560	2,300 00	7 41	225	-	5 00	2 00	-	15 00
Wales,	320,637	29	11,056	1,052 00	3 28	460	-	4 50	1 80	-	17 50
West Springfield,	11,391,075	97	117,433	30,000 00 ²	2 63	-	-	-	-	-	19 40
Westfield,	14,425,880	102	141,430	25,000 00 ²	1 73	-	-	-	-	-	21 80
Wilbraham,	2,307,726	47	49,100	4,500 00	1 95	200	-	5 50	2 25	4 00 ¹	12 00
	\$361,490,530	1,610	-	\$877,537 00	-	-	-	-	-	-	-

County mile value, \$224,528. Average appropriation throughout county per thousand of valuation, \$2.42.

¹ Day.² Estimated.

Hampshire County.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Amherst,	\$7,903,019	75	\$114,185	\$13,483 00	\$1 68	-	-	\$4 50	\$2 00	\$800 00	\$19 50
Belchertown,	1,104,731	140	7,800	5,550 00	5 02	\$300	-	5 00	2 00	-	26 00
Chesterfield,	425,460	56	7,597	2,350 00	5 52	100	-	5 00	2 00	-	20 00
Cumington,	427,219	60	7,120	2,600 00	6 08	400	-	6 00	2 00	-	20 50
Easthampton,	8,860,269	56	158,219	13,400 00	1 51	5,000	\$3 50	5 00	2 25	1,100 00	20 50
Enfield,	905,098	40	22,627	6,850 00	7 56	300	-	5 00	2 25	-	17 00
Goshen,	280,611	32	8,769	800 00	2 85	300	-	4 50	2 00	-	17 50
Granby,	868,471	55	15,790	3,028 00	3 48	300	-	5 00	2 00	-	18 00
Greenwich,	315,815	42	7,519	1,250 00	3 96	150	-	5 00	2 00	-	18 00
Hadley,	2,430,047	62	39,194	9,350 00	3 84	500	3 50	5 00	2 00	-	18 60
Hatfield,	2,269,518	56	40,527	8,000 00	3 52	3,000	-	4 50	2 50	4 00 ¹	22 00
Huntington,	900,160	50	18,003 ²	6,000 00	6 66	-	-	-	-	-	23 00
Middlefield,	271,277	35	7,750	1,700 00	6 27	100	3 00	4 00	2 00	-	25 00
Northampton,	21,374,027	180	118,744	120,000 00	5 61	-	3 50	5 00	2 25	1,350 00	19 80
Pelham,	512,877	38	13,496	1,950 00	3 80	290	-	5 00	2 03	-	15 50
Plainfield,	244,006	42	5,809	1,300 00	5 32	150	-	4 50	2 00	-	21 00
Prescott,	278,167	44	6,321	1,950 00	7 01	150	-	4 50	-	-	19 00
South Hadley,	4,067,561	50	81,351	6,212 00	1 52	4,500	-	5 00	2 50	600 00	25 00

Southampton,	677,970	75	9,039	9,300 00	13 73	500	-	4 00	2 00	-	20 70
Ware,	6,603,594	92	71,778	11,050 00	1 67	600	3 20	4 44	2 25	3 50 ¹	21 50
Westhampton,	340,021	49	6,393	1,850 00	5 44	200	-	5 00	2 00	-	22 50
Williamsburg,	1,421,253	43	33,052 ²	15,000 00	10 55	-	-	-	-	-	21 50
Worthington,	478,458	75	6,379	3,200 00	6 69	200	3 50	5 00	2 00	-	21 30
	\$63,049,629	1,448	-	\$246,173 00	-	-	-	-	-	-	-

County mile value, \$43,542. Average appropriation throughout county per thousand of valuation, \$3.90.

Middlesex County.

Acton,	\$2,903,227	76	\$38,200	\$4,500 00 ²	\$1 55	-	-	-	-	-	\$16 00
Arlington,	19,849,317	69	287,671	73,008 00	3 67	\$21,500	\$4 00	\$5 50	\$2 50	\$2,400 00	21 30
Ashby,	1,189,009	70	16,985	5,000 00	4 20	250	3 50	5 00	2 00	-	17 50
Ashland,	1,553,331	46	33,768	5,800 00	3 73	400	4 00	5 00	2 00	-	22 20
Ayer,	2,536,971	30	84,565	4,725 00	1 86	825	-	4 50	2 00	3 00 ¹	17 90
Bedford,	2,374,506	29	81,879	15,000 00	6 31	4,000	3 50	5 00	2 00	3 50 ¹	19 00
Belmont,	13,667,620	30	455,587	38,650 00	2 82	12,500	4 00	5 50	2 50	1,200 00	18 60
Billerica,	5,980,588	66	90,614	11,305 00	1 89	5,000	4 00	6 00	2 40	3 50 ¹	19 00
Boxborough,	322,503	29	11,120	1,300 00	4 03	100	-	5 00	2 25	-	14 50
Burlington,	1,041,894	41	25,412	4,000 00 ²	3 84	-	-	-	-	-	17 60
Cambridge,	145,450,647	103	1,412,142	233,500 00	1 58	150,000	-	6 00	2 50	2,500 00	23 50
Carlisle,	838,071	60	13,967	1,610 00	1 92	500	3 50	5 00	2 00	-	14 50

¹ Day.

² Estimated.

Middlesex County — Continued.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Chelmsford,	\$5,265,126	92	\$57,229 ¹	\$7,500 00	\$1 42	-	-	-	-	-	\$15 10
Concord,	10,683,902	87	122,803	50,000 00	4 68	\$35,000	-	\$5 08	\$2 50	\$1,800 00	17 00
Dracut,	2,797,559	65	43,039	12,400 00	4 43	-	\$3 00	5 00	2 25	4 00 ²	23 90
Dunstable,	681,336	35	19,466	1,650 00	2 42	150	-	4 50	2 00	-	8 40
Everett,	34,653,684	49	707,218	49,100 00	1 41	20,000	3 75	5 00	2 50	1,800 00	23 90
Frammingham,	19,554,312	100	195,543	76,700 00	3 92	12,175	4 50	5 50	2 50	2,000 00	20 00
Groton,	5,405,576	71	77,402	5,463 00	99	1,500	4 00	5 00	2 00	3 00 ²	12 00
Holliston,	2,276,737	54	42,161 ¹	3,500 00	1 53	-	-	-	-	-	15 50
Hopkinton,	2,048,201	69	29,684	6,810 00	3 32	3,300	-	5 58	2 00	-	20 00
Hudson,	5,117,127	43	119,002	16,800 00	3 28	7,247	3 75	5 00	2 50	1,500 00	22 90
Lexington,	11,270,890	80	140,886	34,988 00	3 10	7,591	-	-	2 25	600 00	23 00
Lincoln,	5,685,144	43	131,980 ¹	15,000 00	2 63	-	-	-	-	-	13 00
Littleton,	1,426,470	46	31,010 ¹	3,000 00	2 10	-	-	-	-	-	20 00
Lowell,	98,385,020	140	702,750	281,000 00	2 85	116,000	-	6 00	2 50	2,000 00	21 20
Malden,	47,408,486	89	532,657	131,900 00	2 78	22,775	3 75	5 00	2 50	2,300 00	21 40
Marlborough,	12,133,000	85	142,741	69,338 00	5 71	15,000	3 60	5 25	2 50	1,300 00	21 60
Maynard,	4,374,512	25	174,980	7,200 00	1 64	5,000	3 50	5 00	2 00	18 00 ³	20 00
Medford,	33,214,921	53	626,696	143,900 00	4 33	25,000	3 50	6 00	2 50	1,800 00	19 80

Middlesex County — Concluded.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Wilmington,	\$2,206,806	52	\$44,171	\$12,000 00 ¹	\$5 22	-	-	-	-	-	\$21 70
Winchester,	20,298,615	43	472,060	27,000 00 ¹	1 33	-	-	-	-	-	18 40
Woburn,	15,899,337	68	233,313	36,600 00	2 30	\$16,000	-	-	\$2 25	\$1,350 00	22 30
	\$808,187,446	3,467	-	\$2,208,114 00	-	-	-	-	-	-	-

County mile value, \$250,414. Average appropriation throughout county per thousand of valuation, \$2.54.

Nantucket County.

Nantucket,	\$4,626,805	114	\$40,586	\$8,775 00	\$1 89	\$1,200	\$4 00	\$6 00	\$2 00	-	\$16 80
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Norfolk County.

Avon,	\$1,189,516	10	\$118,951	\$1,725 00	\$1 45	\$350	-	\$5 00	\$2 40	\$3 00 ²	\$22 60
Bellingham,	1,196,218	44	27,186	3,500 00	2 92	500	\$4 00	5 00	2 00	-	20 00
Braintree,	10,358,813	50	207,176	26,676 00	2 57	7,500	4 00	6 00	2 50	3 00 ²	18 80
Brookline,	176,891,658	70	2,527,923	208,611 00	1 51	20,000	3 50	6 00	2 50	3,500 00	14 80
Canton,	8,196,963	40	204,924 ¹	21,000 00	2 56	-	-	-	-	-	18 80
Cohasset,	11,296,338	26	434,474	23,500 00	2 08	4,500	4 00	5 75	2 40	1,000 00	15 00
Dedham,	17,471,707	55	317,667	66,367 00	3 79	8,000	3 50	5 00	2 25	1,800 00	18 00

Plymouth County.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equip-ment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Abington,	\$4,632,258	53	\$79,866	\$5,450 00	\$1 17	\$900	\$4 00	\$5 50	\$2 50	\$900 00	\$24 30
Bridgewater,	4,844,800	70	69,211	21,869 00	4 51	7,043	4 00	6 00	2 25	1,000 00	21 00
Brockton,	62,254,312	123	506,132	172,895 00	2 77	60,000	4 00	5 50	2 50	1,500 00	22 80
Carver,	2,280,266	67	34,033	9,700 00	4 21	4,000	3 35	4 70	2 00	-	16 00
Duxbury,	4,419,119	90	49,101 ¹	12,000 00	2 71	-	-	-	-	-	17 50
East Bridgewater,	3,354,671	49	68,462	10,400 00	3 10	4,800	4 00	6 00	2 50	4 50 ²	22 20
Halifax,	709,386	32	22,168	1,880 00	2 65	250	2 50	4 50	2 00	-	13 80
Hanover,	2,661,859	45	59,152	35,370 00	13 29	5,000	3 50	5 00	2 00	3 00 ²	17 70
Hanson,	1,933,472	34	56,866	12,500 00	6 46	7,500	3 90	5 41	2 40	3 00 ²	17 70
Hingham,	9,705,455	84	115,541	19,000 00	1 95	9,587	4 15	5 90	2 60	1,200 00	19 70
Hull,	9,889,980	25	395,599 ¹	30,000 00	3 03	-	-	-	-	-	18 30
Kingston,	1,998,080	40	49,952	7,100 00	3 55	1,500	3 60	5 00	2 00	-	18 00
Lakeville,	1,549,885	65	23,844	5,000 00	3 22	-	-	-	-	-	14 00
Marion,	7,988,253	25	319,530	10,309 00	1 29	5,250	3 80	4 70	2 00	-	11 00
Marshfield,	2,908,332	77	37,771	13,356 00	4 59	4,000	3 50	5 00	2 00	-	17 00
Mattapoisett,	2,908,181	33	90,853	8,800 00	2 93	2,000	3 25	4 50	2 00	-	10 50
Middleborough,	5,985,532	196	30,538	23,550 00	3 93	31,000	-	5 00	2 25	1,500 00	21 30

Worcester County.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Ashburnham,	\$1,026,151	125	\$13,009	\$4,100 00	\$2 52	\$150	\$3 50	\$4 50	\$2 00	-	\$22 50
Athol,	7,285,009	86	84,709	26,000 00	3 56	3,000	-	5 00	2 25	\$500 00	23 50
Auburn,	1,978,621	47	42,098	4,500 00	2 27	250	-	5 50	2 25	3 00 ¹	20 80
Barre,	3,071,063	122	25,172	15,678 00	5 10	6,000	3 00	5 00	2 00-2 25	3 50 ¹	20 00
Berlin,	814,134	37	22,003	1,650 00	2 02	400	-	5 00	2 00	-	15 00
Blackstone,	2,597,711	52	49,955	5,200 00	2 00	-	-	-	-	-	24 10
Bolton,	844,849	55	15,360	2,225 00	2 63	250	-	5 00	2 25	-	15 60
Boylston,	680,530	31	21,952	2,500 00	3 67	275	-	4 50	2 00	-	15 60
Brookfield,	1,660,274	60	27,671	2,470 00	1 48	350	3 00	5 00	2 00	-	21 00
Charlton,	1,686,961	130	12,976	4,500 00 ²	2 66	-	-	-	-	-	16 30
Clinton,	9,941,414	35	284,040	26,450 00	2 66	6,000	4 00	6 00	2 00-2 25	1,400 00	24 20
Dana,	536,123	50	10,722	2,100 00	3 91	200	-	5 00	2 00	-	21 80
Douglas,	1,884,857	75	25,131	3,550 00	1 88	1,500	3 25	4 50	2 00	2 70 ¹	11 70
Dudley,	2,753,012	65	42,354	8,050 00	2 92	350	-	5 00	2 00	-	21 90
Fitchburg,	45,470,286	138	329,404	165,500 00	3 63	25,905	3 60	5 52	2 24	2,400 00	20 40
Gardner,	13,873,245	75	184,976	55,215 00	3 98	11,500	3 20	5 00	2 25	1,600 00	20 65
Grafton,	4,289,543	73	58,760	14,990 00	3 49	-	-	4 50	2 00	-	18 50

Worcester County — Concluded.

NAME.	Valuation.	Miles of Highway.	Miles Valuation.	Amount appropriated for Street and Highway Purposes.	Amount appropriated per Thousand of Valuation.	Estimated Valuation of Equipment.	Single Team (per Day).	Double Team (per Day).	Labor (per Day).	Salary of Superintendent (per Year).	Tax Rate.
Phillipston,	\$436,200	46	\$9,482	\$3,100 00	\$7 11	\$200	-	\$5 00	\$2 00	-	\$19 20
Princeton,	1,672,883	77	21,725	6,500 00 ¹	3 88	-	-	-	-	-	12 60
Royalston,	889,462	85	10,464	3,750 00	4 21	-	-	5 00	2 25	-	19 40
Rutland,	1,022,615	85	12,030	3,708 00	3 62	250	-	4 75	2 00	-	22 00
Shrewsbury,	3,372,519	62	54,395	3,675 00	1 09	250	-	5 75	2 25-2 50	\$3 00 ²	17 50
Southborough,	3,696,204	60	61,603	7,000 00	1 89	450	\$3 50	5 00	2 00	5 00 ²	17 20
Southbridge,	8,836,397	69	128,107	28,250 00	3 19	-	3 75	5 00	2 00	1,200 00	21 80
Spencer,	4,398,315	92	47,807	24,550 00	5 57	6,886	3 75	5 00	2 00	3 00 ²	18 00
Sterling,	1,585,180	81	19,570	5,510 00	3 47	563	-	5 00	2 00	-	23 00
Sturbridge,	1,047,780	90	11,642	2,650 00	2 53	600	-	4 05	1 80	-	21 20
Sutton,	1,648,225	92	17,915	10,000 00	6 06	-	-	4 80	2 00	-	23 50
Templeton,	2,331,619	88	26,495	5,800 00	2 48	500	-	4 50	2 00	-	24 40
Upton,	1,450,853	64	22,669	2,300 00	1 58	-	-	4 50	2 00	-	19 00
Uxbridge,	4,855,874	81	59,949	13,850 00	2 85	500	-	5 00	1 75	3 00 ²	16 50
Warren,	2,919,145	72	40,543	6,670 00	2 28	200	-	4 50	1 80	3 25 ²	18 60
Webster,	11,169,386	36	310,260	23,900 00	2 13	6,500	3 25	5 00	1 75	3 00 ²	15 79

West Boylston, .	.	.	.	.	.	1,222,837	55	22,233	2,465 00	2 01	535	-	5 00	2 00	3 00 ²	14 20
West Brookfield, .	.	.	.	.	.	1,184,716	65	18,226	3,850 00	3 25	800	-	5 00	2 00	-	23 00
Westborough, .	.	.	.	.	.	3,751,441	42	80,320	9,043 00	2 41	4,710	3 50	5 00	2 25	21 00 ²	21 70
Westminster, .	.	.	.	.	.	1,172,874	94	12,477	4,400 00	3 75	200	2 80	4 50	1 80	-	21 70
Winchendon, .	.	.	.	.	.	4,918,485	120	40,987	15,040 00	3 18	6,100	3 50	5 00	2 00	3 00 ²	21 00
Worcester, .	.	.	.	.	.	203,715,427	213	956,410	404,650 00	1 98	-	4 00	6 00	2 25	3,000 00	20 00
						\$460,209,654	4,308	-	\$1,160,943 00	-	-	-	-	-	-	-

County mile value, \$106,826. Average appropriation throughout county per thousand of valuation, \$2.52.
¹ Estimated. ² Day. ³ Week.

Summary of Valuations and Street and Highway Statistics for 1916.

COUNTY.	Valuation.	Miles of High- way.	Miles Valuation.	Amount appropri- ated.	Average Amount per Thou- sand.
Barnstable,	\$62,316,258	1,448	\$43,542	\$246,173	\$3 90
Berkshire,	128,274,106	1,825	70,287	411,436	3 20
Bristol,	351,041,678	1,556	225,605	1,112,663	3 16
Dukes,	8,059,567	163	45,962	16,826	2 24
Essex,	558,334,064	1,936	288,395	1,285,634	2 30
Franklin,	49,134,099	1,507	32,603	150,792	3 06
Hampden,	361,490,539	1,610	224,528	877,537	2 42
Hampshire,	63,049,629	1,448	43,542	246,173	3 90
Middlesex,	868,187,446	3,467	250,414	2,208,114	2 54
Nantucket,	4,862,297	114	40,586	8,775	1 89
Norfolk,	432,175,260	1,429	302,431	881,559	2 03
Plymouth,	178,880,652	1,856	96,379	590,371	3 30
Suffolk,	1,859,655,046	690	2,695,152	2,835,674	1 52
Worcester,	460,209,654	4,308	106,826	1,160,943	2 52
	\$5,385,670,295	23,357	-	\$12,032,670	-

State mile value, \$230,580. Average appropriation among counties per thousand of valuation, \$2.23.

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